DOCUMENT RESUME

ED 042 526 24 RC 004 564

AUTHOR	Dankworth, Richard T.
TITLE	Educational Achievement of Indian Students in Public Secondary Schools as Related to Eight Variables, Including Residential Environment. Final Report.
INSTITUTION	Utah State Univ., Logan.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-9-H-030
PUB DATE	May 70
GRANT	OEG-8-9-540030-2024(058)
NOTE	95p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$4.85
DESCRIPTORS	*Academic Achievement, *American Indians, Anxiety, Cultural Differences, *Educational Research, Learning Motivation, Reading Ability, Rural Urban Differences, *Secondary School Students, Self Concept, Statistical Analysis, *Underachievers

ABSTRACT

The objective of the research was to determine the relationship of 8 variables to the educational achievement of 178 Indian public secondary school students in Nevada. The 8 variables were residence environment, mental ability, reading ability, anxiety, self-concept, achievement motive, verbal concept choice, and interaction with the dominant culture. The independent variable, residence environment, included the rural reservation, the urban colony, and the multi-ethnic community. The dependent variable, educational achievement, was measured by performance on the "California Achievement Test." Eight test instruments were used to test 2 hypotheses: (1) that there is a significant relationship between the variables acting together and the educational achievement of Indian students and (2) that a significant contribution is made by each variable to the variability of educational achievement when the other variables are held constant. In addition, the following question was asked: Which of the variables can be removed and still maintain the relationship found in testing the first hypothesis? There was a significant correlation (.01 level) between achievement and the 7 variables acting together. Individually, 4 variables were found to contribute more significantly to the variability of achievement than the others. Reading ability was the variable later excluded from the analysis. (EJ)

BR 9-H-030
PA 24
RC

RECEIVED
AUG 31 1970
NMSU
E.R.I.C.

FINAL REPORT

Project No. 9-H-030
Grant No. OEG-8-9-540030-2024(058)

ED0 42526

EDUCATIONAL ACHIEVEMENT OF INDIAN STUDENTS IN PUBLIC SECONDARY SCHOOLS AS RELATED TO EIGHT VARIABLES, INCLUDING RESIDENTIAL ENVIRONMENT

Richard T. Dankworth, Author
James A. Jacobson, Project Director

Utah State University

Logan, Utah 84321

May 1970

The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore necessarily represent official Office of Education position or policy.

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

RC 004564

TABLE OF CONTENTS

Chapter Page

I. NATURE AND BACKGROUND OF THE STUDY 1

The Need for the Study 1
The Background Information 2

Factors affecting school achievement 2

The Present Problem 8

II. METHOD OF STUDY 10

Hypotheses and Question 10

Hypothesis 1 10
Hypothesis 2 10
Question 1 10

Research Design 10

Statistical analysis 11
Additional analyses 13
Modifications 13

Population 13
Instrumentation 15

The academic achievement measuring instrument 15
The mental ability measuring instrument 15
The reading ability measuring instrument 16
The level of anxiety measurement instrument 16
The verbal concept choice measurement instrument 16
The self-concept measuring instrument 16
The achievement motive measuring instrument 17
The interaction with the dominant culture measuring instrument 17

III. ANALYSIS OF THE DATA 19

Testing of Hypotheses and Question 19

Step 1, Hypothesis 1 19
Step 2, Hypothesis 2 20
Step 3, Question 1 33

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 58

Summary 58

Procedures 58

Page

Conclusions 59

Indian public secondary school students residing in three residence environments 62
Indian public secondary school students residing in a rural reservation environment 63
Indian public secondary school students residing in an urban colony environment 64
Indian public secondary school students residing in a multi-ethnic community 64
Additional conclusions 64

Recommendations 65
Speculation 66

Significant variables 66
Non-significant variables 67

BIBLIOGRAPHY 69

APPENDIXES 74

Appendix A. Taylor Manifest Anxiety Scale 75
Appendix B. Verbal Concept Choice Inventory 80
Appendix C. California Psychological Inventory 83
Appendix D. Achievement Motive Questionnaire 84
Appendix E. Interaction with the Dominant Culture 88

LIST OF TABLES

Table Page

1. Distribution of Indian students by grade and residence environment 14

2. The relationship between the independent variables acting together and achievement, by multiple regression model 21

3. Total group analysis of the contribution that each of seven variables makes to achievement using Ai scale scores as the measure of achievement motive 22

4. Total group analysis of the contribution that each of the seven variables makes to achievement using McClelland's measure scores as the measure of achievement motive 23

5. Rural reservation group analysis of the contribution that each of six variables makes to achievement using Ai scale scores as the measure of achievement motive 25

6. Rural reservation group analysis of the contribution that each of the six variables makes to achievement using McClelland's measure scores as the measure of achievement motive 26

7. Urban colony group analysis of the contribution that each of six variables makes to achievement using Ai scale scores as the measure of achievement motive 28

8. Urban colony group analysis of the contribution that each of six variables makes to achievement using McClelland's measure scores as the measure of achievement motive 29

9. Multi-ethnic community group analysis of the contribution that each of six variables makes to achievement using Ai scale scores as the measure of achievement motive 31

10. Multi-ethnic community group analysis of the contribution that each of six variables makes to achievement using McClelland's measure scores as the measure of achievement motive 32

11. Total group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive 35

12. Total group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive 38

13. Rural reservation group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive . . . 41

Table Page

14. Rural reservation group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive 43

15. Urban colony group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive 45

16. Urban colony group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive 47

17. Multi-ethnic community group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive 49

18. Multi-ethnic community group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive 51

19. The relationship between the independent variables acting together and achievement, reduced analysis and full analysis 54

20. Reduced analysis of the contribution that each of the four variables makes to achievement using Ai scale scores as the measure of achievement motive 55

21. Reduced analysis of the contribution that each of the four remaining variables makes to achievement using McClelland's measure scores as the measure of achievement motive 56

LIST OF FIGURES

Figure Page

1. F-ratio 12

ABSTRACT

Educational Achievement of Indian Students in Public Secondary Schools as Related to Eight Variables, Including Residential Environment

by

Richard T. Dankworth

Project Director: James A. Jacobson

Purpose

The objective of this research was to determine the relationship of eight variables to the educational achievement of Indian public secondary school students. The eight variables were: (1) residential environment, (2) mental ability, (3) reading ability,* (4) anxiety, (5) verbal concept choice, (6) self-concept, (7) achievement motive, and (8) interaction with the dominant culture.

Procedure

The following two hypotheses and one question were tested:

Hypothesis 1. There is a significant relationship between the variables of residence environment, mental ability, reading ability, anxiety, self-concept, achievement motive, verbal concept choice and interaction with the dominant culture, when acting together, and the educational achievement of Indian students.

Hypothesis 2. A significant contribution is made by each of the eight variables to the variability in educational achievement of Indian students, when the other variables are held constant.

Question 1. Which of the eight variables can be removed and still maintain the relationship found as a result of testing hypothesis 1?

The population of this study included 178 Indian students, grades 7-12, living in Washoe County, Nevada, categorized by residence environment. The Indian students attended public secondary schools and resided in a rural reservation, an urban colony, or a multi-ethnic community.

Analysis

A stepwise multiple regression program was used to analyze the data. This program met the demands for handling both continuous and categorical variables in the same statistical model. Analyses were made using four groups. The full group was examined regarding the relationship between seven variables (including residence as an independent variable) and achievement for the total population of Indian students. Three residence groups were then constructed and an analysis made regarding relationships between the remaining six variables and achievement.

---

*Reading ability was later excluded from the analysis.

Findings

Indian students residing in three residence environments. For the total population it was found that seven variables, when acting together, correlate significantly (.01 level) with the achievement of Indian public secondary school students. Sixty and six-tenths percent of the variability in achievement of Indian students can be accounted for by these seven variables.

Indian students residing in a rural reservation. Six variables, when acting together, correlate significantly with achievement of Indian public secondary school students residing in a rural reservation. Sixty-four and one-tenth percent of the variability in achievement of rural reservation students can be accounted for by these six variables.

Indian students residing in an urban colony. The same six variables, when acting together, correlate significantly (.01 level) with the achievement of Indian public secondary school students residing in an urban colony. Sixty-four and five-tenths percent of the variability in achievement of urban colony students can be accounted for by these six variables.

Interaction with the dominant culture tends to have a negative effect on the achievement of Indian students from an urban colony.

Indian students residing in a multi-ethnic community. The same six variables, when acting together, correlate significantly (.01 level) with the achievement of Indian public secondary school students residing in a multi-ethnic community. Sixty-three and seven-tenths percent of the variability in achievement of multi-ethnic community Indian students can be accounted for by these six variables.

CHAPTER I

NATURE AND BACKGROUND OF THE STUDY

The purpose of this investigation was to study the relationship of eight variables to the educational achievement of Indian public secondary school students. The eight variables were: (1) residential environment, (2) mental ability, (3) reading ability, (4) anxiety, (5) verbal concept choice, (6) self-concept, (7) achievement motive, and (8) interaction with the dominant culture.

The Need for the Study

American Indians today are looking to formal education as a solution to many of their present problems--poverty, poor health, social disintegration, and political impotence. At the same time, educators and tribal leaders throughout the country do not understand why the vast sums of money spent thus far on the education of Indian youth have not produced more college graduates and skilled workers (Parmee, 1968).

A good portion of Indian students now attend public schools where they are being exposed to learning experiences which can prepare them for useful and purposeful lives on or away from the reservation. Studies indicate, however, that the rate of academic progress for Indian students beyond the fourth grade level is significantly below that of non-Indians. Parmee (1968) noted that as the complexity of the curriculum mounts from grade level to grade level, the intensity of academic problems seem to worsen. A study by Bass (1968) supports this notion. He found that while 3,376 Indian students progressed in their academic achievement from grades 9-12, the 12th graders, according to national norms, were completing high school almost three grades retarded academically. At the same time, Indian youth were dropping out of high schools in a large portion of the United States at a rate three times greater than non-Indians (Selinger, 1968).

Indian culture is in a state of amblivalence with respect to reservation and the larger American culture, economy, and values. Evidence of this ambivalence can be seen in the voluntary relocation of Indian people from reservations to multi-ethnic communities. Cultural ambivalence may also be observed among people living in Indian colonies or trust lands which were originally established on the periphery of cities and towns. These settlements are now encompassed by such communities and included in their economic and political milieu.

Research studies provide relevant data concerning the relationship between environment and achievement of Indian students. Coombs, Kron, Collister, and Anderson (1958) found strong evidence that Indian pupils who live on a reservation do not achieve as well as those who do not. They also concluded that, in general, pupils (Indians and non-Indians) who live in town achieve higher in the basic skill subjects than those who live in the country. According to Parmee (1968), the educational achievement of Apache children was adversely affected when their family moved to new areas on or off the reservation. The researchers in each of these studies noted differences in achievement levels by environment but did not identify specific factors which influenced these differences. Melville (1966), on the other hand, compared Indian and non-Indian students on seven factors associated with academic achievement. His sample included 7th through 12th grade Navajo students who had been relocated for the school year from a reservation to a Bordertown Dormitory program and enrolled in the public schools of a multi-ethnic community. In addition to other factors, he found that interaction with the dominant culture was associated with the achievement of the Navajo youths. Melville pointed to a need for further research into factors affecting the achievement of Indian students.

Assuming that a relationship between residence environment and achievement does exist, a replication of Melville's (1966) factor and instrument techniques in new research which extends the scope of inquiry to include Indian students from different environments would serve to expand knowledge in a needed direction. It would seem that any school district, engaged in educating Indian students from different environmental backgrounds, could use the results of such a study in planning their curriculum to accommodate such cultural groups.

The Background Information

Factors affecting school achievement

There are about 300 Indian tribes and identifiable groups in the United States. A few of these clusters of Indian people are living today much as their ancestors did 300 years ago; others are practically indistinguishable economically and socially from their non-Indian neighbors; and the great majority are somewhere between the two extremes (Ware, 1961). Attitudes among most Indians have changed perceptibly in recent years. Surrounded by a society bewitched by the lure of progress, "the American Indian has come to learn that tradition is the enemy of progress." (McCombe, Vogt, and Kluckhohn, 1951, p. 82) Today, Indian people are looking to formal education for solutions to their many problems (Parmee, 1968).

Parmee (1968) categorized current Indian problems as originating in social conflict, economic deprivation and cultural instability. Implicit in each of these major problems are factors which affect Indian students' capacity to perform in school. Left unidentified and unattended, these factors retard the academic progress of Indian youth and, in so doing, deter the ultimate resolution of Indian problems (Selinger, 1968).

Obviously, many factors could be investigated, but the literature has indicated that the following factors are closely associated with success in school: residential environment, mental ability, reading ability; anxiety; verbal concept choice; self-concept; achievement motivation, and interaction with the dominant culture (Melville, 1966).

Residential environment. That factors may vary among Indian students from different environments is suggested by Spindler:

> When socio-cultural conditions change the individual struggles to adapt to these conditions, and in so doing, the organization of his emotional and intellectual resources changes . . . This psychological organization develops out of interaction with people (parents, teachers, and peers) as cultural agents who are carrying out roles provided by the social system and cultural patterning of their group, but who are modifying these roles constantly as adjustments are made to various situations and as they are interpreted by the individual cultural agent. (1968, p. 353)

Coombs, Kron, Collister and Anderson state: " . . . the extent to which an Indian family or community has integrated itself with the dominant culture of the nation has a very great influence upon the social achievement of its children." (1958, p. 96)

Indian families in Nevada are identified with reservation, colony, or multi-ethnic community environments. Social and economic conditions vary within each of these groups. As a result, Indian boys and girls come to public schools from a wide variety of home conditions and social backgrounds as any comparable group of children (Haglund, 1961).

The rural reservation. Current information indicates that there are 399 Indians living on 475,086 acres at the Pyramid Lake Reservation. Of these people, 99 percent are Paiute, the remaining few claim Shoshone or mixed tribal heritage (Inter-tribal Council Bulletin, 1969). Most of the population reside in and around the small community of Nixon. Industry on the reservation is limited. Increased costs of farming, land erosion, lack of credit, inadequate implements and a limited water supply have caused a serious decline in agriculture and cattle raising. As a result, some of the men now commute to neighboring towns to work (Harner, 1965). This, in part, explains the peaks of $1,001-$2,000 and $5,001-$6,000 in the range of income of residents (Leland, 1962). Despite the educational attainment level of grade 10 among employable adults, the unemployment rate for males is 23 percent and for females 75 percent. In general, reservation housing is in poor condition (Leland and Gomberg, 1964).

According to Harner (1965), the Pyramid Lake Indians prefer to remain Indian while residing in an Indian dominant area rather than move into prodominant white zones. Paiute language is still spoken in most of the reservation homes, especially where there are older people. Many of the children are bilingual in that they understand the Paiute language but do not speak it. Despite a desire to retain the old, changes are occurring in the band. The lack of economic opportunity has not only forced some of the adults off the reservation each day for work, but is having its effects on the young. More are leaving the reservation each year to find opportunity elsewhere in Nevada and other states (Harner, 1965).

The urban colony. Christensen (1968) describes the Reno-Sparks Indian Colony as 28.88 acres of unlevel, rocky land located on an alluvial fan of the Truckee River. All the land is now being used for residential purposes despite the fact that the surrounding area is rapidly becoming the industrial section of Reno and Sparks. The original tract was divided into small lots and assigned to individual tribal members under the jurisdiction of the Nevada Inter-Tribal Council. Since that time, lots have changed hands and Indians from tribes other than the original assignees have assumed occupancy.

Current census figures show 499 Indians residing in the Colony (Inter-Tribal Council Bulletin, 1969). This is a population density equal to twice that of Reno. A survey conducted by the Public Health Service, Division of Indian Health, anticipates that if the Colony continues to grow as it has, the total population by 1975 will be 1,076--a density in excess of that in New York State (Christensen, 1968). The majority of the residents claim Washoe and/or Paiute identity, although other tribes such as the Shoshone, Sioux. and Navajo are also evidenced (Inter-Tribal Council Bulletin, 1969). The median family income in the colony is $3,250 with bimodal peaks at the $0-2,499 and $4,000-$6,999 levels. This is partly due to the unemployment rate of 17.3 percent among employable females and 17.9 percent among males. The adult median educational level of colony residents is grade 11. Housing conditions in the colony are substandard. However, the Tribal Council, working with the Bureau of Indian Affairs and Public Housing Authority, have planned and commenced construction of 50 new homes. A recent development by the Public Health Service of a sewer and water system has significantly improved the environmental health conditions of the colony. These systems, completed in 1968, connected each house in the colony to the city water and sewer systems. Gas has also been made available to all homes (Christensen, 1968). Christensen (1968) outlined the special programs which are currently being conducted in the colony:

> It would appear that there is no lack of special programs for the Indians at the colony. At the present time, the Inter-Tribal Council of Nevada is working under a grant from the Office of Economic Opportunity. The colony has a community development specialist working with the people, a Neighborhood Youth Corps Program, and has just recently started a Work Incentive Program and a Headstart Program involving 40 pre-school children, two teachers and four teacher aides, and a bus driver.

> The Inter-Tribal Council has had two VISTA workers in the colony for the past two years. In addition to this, the city of Reno has been running a special recreation program for the summer. The Colony Christian Center is administered by the Baptist Church but it is a community project in that it received funds from the Community Fund Program. This money is set aside to work with the youth.
>
> In conjunction with HUB, the Tribal Council of the colony has embarked upon a project to improve the living conditions and provide a playground for the children. An overall plan is being developed which will include a park, a neighborhood facility, an improvement of the road, improvement of individual lots, and some type of border or screen to screen out the industrial area. At the present time $50,000 has been raised for the building of the park which should be completed by October 1968. (1968, p. 5)

Multi-ethnic community. Over the years many Washoe County Indian families have broken ties with the reservation or colony and moved into areas within the county which are of multi-ethnic composition. One of the disadvantages accompanying this movement from reservation to non-reservation status is ineligibility for benefits and services from the Indian Bureau. According to Haglund (1961), a strict interpretation was made a number of years ago, whereby benefits were limited to Indian families residing on trust lands, i.e., reservations or colonies. Therefore, Indians who have left the trust domain, have chosen to relinquish the right to hospitalization and medical care, welfare assistance, vocational training, enrollment of children in Indian Bureau operated schools and non-payment of taxes all for the new opportunities which await them in the multi-ethnic community.

Limited social, economic and educational information is available regarding Indian families who have moved from the reservation or colony to multi-ethnic communities in Washoe County. In fact, due to intermarriage and assimilation there is no accurate census data available on the numbers extant or their tribal background. Christensen hints at the economic level of this group as compared to colony residents in the following statement:

> It should be pointed out that economic conditions at the colony are not necessarily the same for all Indians in Washoe County. Approximately one-half of the Indians in Washoe County live in the colony. Many others live in the Reno-Sparks area. If these were included, the income level would be much higher than that projected for Indians in the colony. (1968, p. 4)

Haglund (1961) conjectures that Indian families who have moved into multi-ethnic communities have become well integrated. The parents are educated and the family breadwinner is regularly employed, usually at some specialized occupation or trade. In addition, the children have always attended public school and are well assimilated.

Mental ability. The literature of educational research has identified mental ability as a significant factor in influencing academic achievement among non-Indian students (Vineyard and Baily, 1960; Bental, 1966; Keller and Rowley, 1964). In 1937, Garth reported a correlation of .75 between verbal intelligence and educational achievement of Indian children. Similarly, Melville (1966) found that mental ability, as measured by a standardized achievement test, was significantly related to the academic achievement of Navajo students.

Researchers have been concerned with the effects of environment performance in tests of mental ability. Havighurst and Hilkevitch (1944) partially attributed differences found between Indian tribes and between groups within tribes, to exposure to the dominant culture. The work of Johnson at Boy's Town, Nebraska, showed that environment had a very beneficial effect with regard to mental ability scores. Following two years of residence at Boy's Town, significant improvement was seen in test scores of Mexican-American boys. Improvement in academic achievement was also noted.

Reading ability. Research studies support the position that reading ability has a direct bearing on achievement in school (Bond, 1938; Vineyard and Baily, 1960; Seegers and Rose, 1963). Ort (1962) suggested that reading ability is the key to success in every scholastic area. Results of an investigation by Balow (1964) into problem solving support this notion. He found significant association between reading ability and computational skill among 468 sixth grade students. Studies by Zintz (1965) and Morris (1966) of Navajo, Apache, Pueblo, Spanish-American and Anglo children in public schools showed that the inability to read was related to educational retardation of certain minority ethnic groups. Melville (1966) concluded that of several variables, reading ability showed the strongest relationship to academic achievement of Navajo students. Tireman (1955) linked reading problems with the home environment. He said that economic status, education of the parents, general cultural level, emotional pattern, health standards, mobility, rural or urban residence, and attitude towards the English language were all interlocking factors contributing to reading problems of bilingual children.

Anxiety. The relationship between anxiety, learning, and achievement is currently a focus of research and controversy (Wallace, 1965). Biggs (1959) surveyed the literature on arithmetic and number anxiety. There appeared to be some evidence that anxiety prevented a child from realizing his full potentialities. In contrast, Lynn (1962) and Lynn and Gordon (1961) asserted that anxiety, by increasing drive strength, facilitated attainment as it motivated sustained work. The facilitation disappeared, however, if anxiety reached a level at which the interfering effects of stress began to operate. Lynn (1962) suggested that a moderate level of anxiety was optimum for efficient performance. Reese (1961) studied the relationship between elementary school children's performance on an achievement test and level of anxiety as measured by an anxiety scale. He found significant negative correlations between anxiety and achievement. On the other hand, Melville (1966) found no significant relationship between anxiety and academic achievement of Navajo students. Compared with non-Navajos in the same study, however, the Navajo students were more anxious.

Verbal concept choice. Carroll (1964) pointed to the importance of verbal concept choice to student achievement. Translating printed words into their spoken counterparts and knowing what concepts they represent is fundamental to the reading process and achievement in school (Edwards, 1965). Verbal concept development has been measured by vocabulary tests. Phillips (1960) and Seegers and Rose (1963) found significant relationships between verbal comprehension and achievement among students in a secondary school or college. That verbal conceptualization may be a factor in achievement of Indian students was suggested by Melville (1966). He found Navajo students operating at a lower level of conceptualization than their non-Navajo peers. A study by Morris (1966) also disclosed lower verbal conceptual development among Pueblo Indian students. The students were found to be academically retarded. The relationship between environment and vocabulary development was shown in a study by Carson and Robin (1960). Matching Negro children from two different geographic areas, northern children scored higher than southern children on two measures of verbal communication. Zintz (1965) reported results of four separate research projects which measured the level of understanding of idioms, multiple meanings, simple analogies and other facets of the English language among students from various cultural backgrounds. According to Zintz (1965), researchers found that Anglo fourth grade children earned higher scores on tests of knowledge of these various facets than sixth graders from Navajo, Zuni-Pueblo, and Spanish-American environments.

Self-concept. Researchers have found a relationship between the self-concept of students and their academic achievement. Gay (1966) reported significant correlations between self-concept scores and scores on intelligence and achievement tests administered to Negro students. The data justified the primary conclusion that the student's self-concept was more a motivational factor in academic achievement than intelligence. Findings by Binder (1965) revealed that self-concept of ability contributed significantly to the grade point averages of 705 ninth and twelfth grade students. Research by Maynard (1968) disclosed a prevalent negative self-image among Oglala Sioux high school students. In addition to under achievement in school, Maynard concluded that a negative self-image leads to a sense of futility, avoidance of competitive situations and a reluctance to assume leadership; these factors which contributed to feelings of powerlessness, preventing Indians from achieving greater control of their destiny. In a study by Melville (1966), the self-concept factor neither facilitated nor retarded academic achievement of Navajo students. However, among non-Navajos measured in the same study, there was a positive correlation between self-concept and level of achievement.

Achievement motive. The relationship between achievement motive and actual achievement in school has been the center of interest in much research. Strong (1963) found that high achievement motive was related to better performance in certain learning tasks. Results of a study by McBee and Duke (1960) pointed to achievement as a function of motivation, not mental ability. In high and low mental ability students, an increase in achievement motive resulted in an increase in performance. Other research revealed evidence of a relationship between perceived parental valuing of achievement and the fact of achievement among boys and girls in high school (Christopher, 1967). Some studies have indicated that achievement motive was related to social class and culture (Roseu, 1961, and Havighurst, 1957). Maynard and Mandell (1968) found that low motivation was an important factor in the poor scholastic achievement of Oglala Sioux high school students. They identified a number of elements which seemed to interfere with these particular students' motivation to achieve. Research on Navajo students showed a negative correlation between achievement motivation and academic achievement. This negative relationship was attributed to one of two possible causes: the achievement motive measure used or the fact that motivation to achieve individually has not been a traditional characteristic of the Navajo people. Achievement motive was significantly related to the achievement of non-Navajo students included in the same study (Melville, 1966). According to Weiner (1967), students scoring high in need for achievement appear to be striving for achievement-related goals and to engage in activities which will lead to those goals. These individuals also have greater ability to delay gratification. They tend to forego a smaller immediate reward to obtain a larger reward at a later time. This behavior is not exhibited as frequently by subjects low in need for achievement.

Interaction with the dominant culture. The importance of interaction with the dominant culture to the education of Indians was noted in a study by Spindler (1968). He found that the higher the education level among Pine Ridge Reservation Indians, the greater the likelihood that the respondents (sample population) had lived one year or more outside the reservation. Coombs, Kron, Collister and Anderson (1958) said that Indian students in public schools achieved higher on the average than Indian students in federal or mission schools because they were more culturally advanced. Their sample included 13,686 Indian students in 11 states. Results of interviews conducted by Melville (1966) with Navajo students showed that interaction with the dominant culture not only provided greater opportunity for these students to acquire English verbal and reading skills, but also provided valuable insights into the connection between academic success, placement in rewarding employment and the accumulation of material goods and comforts. Melville concluded that interaction with the dominant culture very likely influenced the achievement of these students. According to Roessel (1963), the most successful Indian students in higher education were those who committed themselves to accepting the dominant culture or completely identified with white society.

The Present Problem

Background information has been provided from research which attempted to assess the relationship between the eight variables involved in this study and achievement in school. In most instances, available research involved the general school population rather than Indian students in particular.

Although not always conclusive, there was evidence that the variables of residence environment, mental ability, reading ability, level of anxiety, verbal concept choice, self-concept, acheivement motive and interaction with the dominant culture contribute to the academic achievement of students in school. Much of this evidence applies to public school students in general, although some has application to minority ethnic groups.

The problem, then, is that we do not have sufficient evidence to determine whether these eight variables, acting individually or together, make a significant contribution to the differences in achievement of Indian public secondary school students.

CHAPTER II

METHOD OF STUDY

Hypotheses and Question

A review of the literature indicates that variables of mental ability, reading ability, anxiety, verbal concept choice, self-concept and achievement motivation are related to achievement of students in school. Research also identifies the environment, or where students live, as an important variable in their achievement. However, evidence is inconclusive as to how these variables act individually and together in their contribution to achievement of Indian students. From this information, the following hypotheses and question have been formulated for testing.

Hypothesis 1

There is a significant relationship between the set of variables, residence environment, mental ability, reading ability, anxiety, self-concept, achievement motive, verbal concept choice and interaction with the dominant culture, when acting together, and the educational achievement of Indian students.

Hypothesis 2

A significant contribution is made by each of the eight variables to the variability in educational achievement of Indian students, when the other variables are held constant.

Question 1

Which of the eight variables can be removed and still maintain the relationship found as a result of testing Hypothesis 1?

Research Design

Analysis was carried out utilizing the response of 140 Indian public school students, grades 7-12, living in Washoe County, Nevada. These students were enrolled in 12 secondary schools in Washoe and Lyon Counties. To check on the relationship of residence environment with other variables to academic achievement, Indian students were classified as rural reservation, urban colony, and multi-ethnic community from records in the district offices. The final distribution of subjects on whom complete data could be secured numbered 140--39 from the rural reservation, 51 from the urban colony and 50 from the multi-ethnic community.

For purposes of analysis, what is hereafter referred to as the total group was analyzed. In this group, educational achievement was classified as a dependent variable; residence environment, mental ability, reading ability, level of anxiety, self-concept, achievement motive, verbal concept choice and interaction with the dominant culture were classified as independent variables.

Statistical analysis

A stepwise multiple regression technique was used to analyze the data. This was required since the variable, residence environment, was categorical in nature and the standard use of multiple regression assumes that each variable is continuous or included in terms of a quantitative measure. This multiple regression program was available in a computer package at Utah State University and met the demands for handling both continuous and categorical variables in the same statistical technique. The package developed by Dr. Rex Hurst, Department Head and Professor of Applied Statistics and Computer Science at Utah State University, enabled the researcher to specify subsets of a variable, such as rural reservation, urban colony and multi-ethnic community, to be considered as a single variable, residence environment. According to Hirschi (1969), this program technique was an adaptation of general regression procedures described by Draper and Smith (1966) and special treatment of categorical variables developed by Harvey (1960, 1964). This statistical approach was a change in the technique originally proposed for the study. The reason for the change was that the original technique could only be used with continuous variables. Thus, the variable residence environment would have had to be eliminated from the mathematical model.

Step 1. Hypothesis 1. The first step was to run an analysis of variance for the regression on the total group. This produced a multiple coefficient of determination (R^2) for the seven basic variables. An F-test was than made to determine if the R^2 was significantly different from 0. The .05 level was the criterion of significance.

Step 2. Hypothesis 2. The second step was to compute the mean square and F-ratio for each of the independent variables. Each continuous variable had one degree of freedom. However, the categorical variable, residence environment, had two degrees of freedom which was the result of the dummy variables (categories of residence environment) associated with it. The F-ratio was used to determine significance regarding the unique contribution each independent variable made to the dependent variable, achievement. The .05 level was the criterion of significance.

Andrews, Morgan and Sonquist have described this concept as follows:

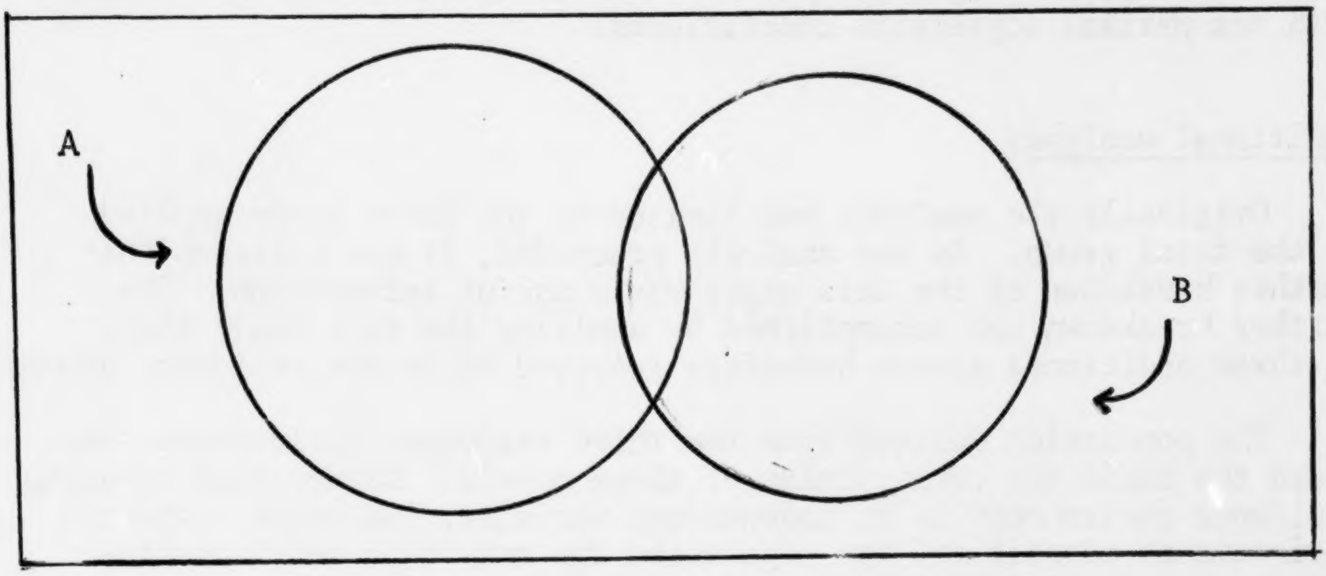

Figure 1. F-ratio.

> The total area within the box represents the variation of the dependent variable. The area enclosed within the Circle A shows the portion of this variation which can be explained by Predictor A. The area within Circle B shows the variation attributable to Predictor B. The total enclosed area is less than the sum of the area enclosed by the two circles separately since the circles overlap. (1967, p. 14)

If other variables are added, similar overlapping may occur. The F-ratio, then, is a measure of that proportion of information that a variable being measured adds that no other variable does. The larger the F-ratio, the larger the unique contribution of the variable.

Step 3. Question 1. The third step in the analysis procedure was to analyze the total group using a stepwise regression technique. The stepwise technique identified the one variable which contributed least to the dependent variable. That variable was then deleted from the model. This process was repeated until one variable remained which contributed most to achievement. It was possible to determine the amount of contribution explained by a particular variable by subtracting any of the basic variables from the one just preceding it.

The partial regression coefficient was produced for each independent variable (three for residence environment). The partial regression coefficient indicated the amount of change in achievement score per unit change in the independent variable. (It is important to note that a unit change in one of the continuous variables does not always mean the same as a unit change in another due to the different ranges of possible scores associated with the instruments used.)

In order to secure partial regression coefficients for the three categories of the variable residence environment, an assumption was made that the sum of the coefficients of the categories was 0. The three categories were represented by two dummy variables (the third category assumed to be dependent upon the first two) which produced three coefficients, the algebraic sum of which was equal to 0.

Thus, the seven basic variables, when augmented by the two dummy variables representing three residence environments produced a model with ten partial regression coefficients.

Additional analyses

Originally the analysis was limited to the above steps applied to the total group. As the analysis proceeded, it was reasoned that a further breakdown of the data might yield useful information. The further breakdown was accomplished by applying the same above steps to three additional groups hereafter referred to as the residence groups.

The population derived from the three residence environments provided the basis for construction of these models. Rather than treating residence environment as an independent variable, the three residence environments constituted the population for examining relationships between the remaining six independent variables and achievement. In this way, specific information was gained on each group.

Modifications

In addition to the change in statistical treatment and further breakdown of the data, two modifications were made in the analyses. Reading ability was initially included as an independent variable. However, since reading ability was not measured independently of achievement (dependent variable) it could not be used in the analysis. That is, the reading ability score was taken from the California Achievement Test which was used to measure achievement. Thus, any correlation between reading ability and achievement would be partly due to the correlation of reading ability with reading ability.

Two separate analyses were made in each group, one using the Ai scale scores for achievement motivation, and the other using the scores from McClelland's measure. The reason for this procedure was that if both were included, the multiple correlation would be distorted since the scores reflect measures of the same variable. Information from both analyses is reported.

Population

The data were gathered from 140 Indian public school students, grades 7-12, living in Washoe County, Nevada. Originally, 178 secondary students were identified for inclusion in the study from records in the district offices. However, 22 of these students dropped out of school prior to or early in the testing program. In addition, another 16 students were eliminated from the analysis because of incomplete test results due to absences during testing periods. This is explained in greater detail in Table 1.

Table 1. Distribution of Indian students by grade and residence environment

Grade	Residence Environment	Population	Drop-outs	Incomplete Data	Total in Study
7	RR[a]	5			5
	UC[b]	17	1	2	14
	MEC[c]	14	1	3	11
					30
8	RR	9	1		9
	UC	12	1		11
	MEC	16			16
					26
9	RR	6			6
	UC	11		1	10
	MEC	19	2	1	16
					32
10	RR	5			5
	UC	10	2		8
	MEC	15	5	3	7
					20
11	RR	7			7
	UC	12	3	2	7
	MEC	10	4	1	5
					19
12	RR	7			7
	UC	7	3	3	1
	MEC	6	1		5
					13
	Totals	178	22	16	140*

All students N - 140, Mean Grade = 9.07

a. Rural reservation students N = 39, Mean Grade = 9.59

b. Urban colony students N - 51, Mean Grade - 8.73

c. Multi-ethnic community students N = 50, Mean Grade - 9.08

*Four of the above students, one in grade seven, one in grade nine, and two in grade ten failed to complete the McClelland instrument. As a result, the succeeding analyses using McClelland's measure scores for achievement motive shows an N of 136 for the full model and an N of 37 for the urban colony model.

The Indian students were enrolled in 12 schools in Washoe and Lyon Counties. The Washoe County schools are organized, with separate facilities, on a 6-3-3 basis. The majority of all students in Washoe County (including Indian students) progress through their educational experience under this system. However, due to the great distance of reservation homes from secondary schools in Washoe County, the school district has arranged with the Lyon County School District to educate these students in the community of Fernley. The school at Fernley is organized on a K-12 basis. After an elementary education through grade six on the reservation, Indian students transfer to Fernley for their final six years of schooling.

For purposes of comparison, students were categorized by residence environment from records in the district offices. The final distribution of subjects on whom complete data could be secured numbered 140; 39 from the rural reservation, 51 from the urban colony, and 50 from the multi-ethnic community.

Instrumentation

The variables included in this study, other than residence environment, were first identified by Melville in a dissertation at Utah State University in 1966. Data on these variables for Indian students in Washoe County, Nevada, were obtained from permanent records on file in district offices, the schools and from instruments administered by school counselors under the direction of the researcher. The following instruments were identified by Melville (1966) as having former application in cross cultural studies with subjects from several socio-economic levels.

The academic achievement measuring instrument

The academic achievement of subjects in this study was measured by the California Achievement Test. Junior and senior high school forms of the test were used at their appropriate levels. The California Achievement Test has sub-tests in reading, arithmetic and language. The total score was taken as the measure of academic achievement. Buros (1965) indicates that the CAT is a well constructed test. In addition to Melville (1966), other researchers have used this test to measure academic achievement among ethnic groups (Osborne, 1960; Rupiper, 1960). Reliability coefficient for the total battery is .98.

The mental ability measuring instrument

The mental ability of subjects in this study was measured by the California Test of Mental Maturity, Short Form. The test consists of two parts, verbal and non-verbal. Both parts were used to obtain a score for each subject. The reliability coefficients range from .81 to .91.

Other researchers have used this test to measure the mental ability of students from different ethnic and socio-economic backgrounds. Davis and Havighurst (1948) found that the CTMM as compared to four other widely used tests had the least amount of discrimination among such groups.

The reading ability measuring instrument

The reading sub-test from the California Achievement Test was used to provide a reading score for each subject. However, this variable was later omitted from the analysis because of the measure used. Due to the interdependence of the instruments, any correlation between reading ability and achievement would be partly due to the correlation of reading ability with reading ability as measured by the same tests.

The level of anxiety measurement instrument

A modified form of the Taylor Manifest Anxiety Scale was used to measure nine subjects' level of anxiety. The test totaled 99 items, 44 of which were dummy items and 50 of which formed the scale which has a reliability coefficient of .81. More than half the original items had been rewritten by Taylor for use with a non-college population (Taylor, 1953). Each subject was requested to respond to all test items, true or false, as they applied to himself. The number of "correct" answers indicated the level of anxiety--the higher the score, the greater the degree of anxiety. A sample of this instrument is found in Appendix A.

The verbal concept choice measurement instrument

Verbal concept choice or concept development was measured with an instrument devised by Dr. David R. Stone, Professor of Psychology, Utah State University (Stone, 1946). Similar to vocabulary tests used in other studies (Chase, 1961), this instrument consists of 34 words, each with six definitions. Two of the definitions are correct and four incorrect. One correct definition has a higher conceptual level than the other. Subjects were requested to indicate the best and next best definitions. Responses were scored according to conceptual order then totaled; the greater the score, the higher the level of verbal concept development. The correct order received maximum points, reverse order received less. No points were given for incorrect definitions. A sample of this instrument is found in Appendix B.

The self-concept measuring instrument

The self-concept of subjects in this study was measured with three scales of the California Psychological Inventory. The three scales were:

> Cs (capacity for status) to serve as an index of an individual's capacity for status (not his actual or achieved status). The scale attempts to measure the personal qualities and attributes which underlie and lead to status.

> Sp (social presence) to assess factors such as poise, spontaneity, and self-confidence in personal and social interaction.
>
> Sa (self-acceptance) to assess factors such as sense of personal worth, self-acceptance, and capacity for independent thinking and action. (Gough, 1953, p. 12)

Certain items were deleted from the inventory as they were considered inappropriate for this cultural group. A list of the item numbers used is shown in Appendix C. The mean of the three scales scores was used as the measure of self-concept. Melville (1966) indicated that the California Psychological Inventory had been used in its entirety or in part in prior cross cultural studies and in studies of correlates of academic achievement. The item numbers used in this study are listed in Appendix C.

The achievement motive measuring instrument

Both objective and projective instruments were used to measure achievement motivation. According to Gough (1953) the Ai (Achievement via independence) scale of the California Psychological Inventory identifies those factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive factors. The number of correct responses by a subject indicated his level of achievement motivation. The items used are listed in Appendix C.

A projective measure developed by McClelland (1953) was also used. McClelland had subjects write short imaginative stories about four pictures from Murray's Thematic Apperception Test. Melville (1966) utilized verbal cues instead of picture cues which might have influenced particular cultural interpretations. Melville's procedure was followed in this study although McClelland's (1953) method of scoring the stories was used.

The instruments were administered by the head counselors of each school. After the data were gathered, all instruments were scored by the Director of Guidance and Counseling, Washoe County School District who is a psychologist trained in the use of projective type instruments. A sample of this instrument is found in Appendix D.

The interaction with the dominant culture measuring instrument

An instrument developed by Melville (1966) was used to determine the subjects interaction with the dominant culture through: (a) the location of the home, (b) time in attendance at school with non-Indian students, and (c) encounter with the dominant culture through work, participation in community activities, visits to theaters and restaurants and association with non-Indians outside of school. Counselors interviewed each subject. Responses were weighted according to high interaction, moderate interaction and low interaction and a total score determined. A sample of the instrument is found in Appendix E.

All instruments in this study were administered by the head counselors in the schools under the coordination and supervision of the Director of Guidance and Counseling, Washoe County School District and the researcher. Depending upon their nature, the instruments were scored either by the Director of Guidance and Counseling, the researcher or by machine. Scoring procedures recommended by the authors of the several instruments were followed. A score for each measure was recorded for each student.

CHAPTER III

ANALYSIS OF THE DATA

Testing of Hypotheses and Question

Step 1, Hypothesis 1

There is a significant relationship between the set of variables of residence environment, mental ability, anxiety, self-concept, achievement motive, verbal concept choice, and interaction with the dominant culture, when acting together, and the educational achievement of Indian students.[1]

Total group. The multiple regression analysis produced a relationship, R^2, of .606 (using the Ai scale to measure achievement motive) between the seven independent variables acting toegether and achievement scores. This was significant at the .01 level. An R^2 of .606 means that 60.6 percent of the variability in educational achievement can be explained by the seven variables included in the model. When scores from McClelland's achievement motive measure were included in the model in place of those from the Ai scale, on R^2 of .599 resulted. This also was significant at the .01 level. On the basis of these results, we must accept the hypothesis that there is a significant relationship between the seven variables when acting together, and the educational achievement of Indian students.

The slight difference in correlation when scores from McClelland's measure were substituted for the Ai scale scores could have been due to differences in the two instruments. McClelland's is a projective-type instrument which requires subjective responses, while the Ai scale (part of the CPI) is a true-false instrument.

Residence groups.

Rural reservation group. With scores from either measure of achievement motive in the model, the multiple regression analysis produced a relationship (R^2) of .641 between the six independent variables acting together and achievement. The same relationship of .641 was produced using McClelland's measure scores in the analysis. Thus, 64.1 percent of the variability in achievement of rural reservation students can be explained by the six variables in the model. This was significant at the .01 level.

Urban colony group. Once again slight differences appeared in the R^2 when scores from different achievement motive instruments were used in the regression model. Using Ai scale scores, 64.5 percent of the variability in achievement among urban colony students can be explained by the six variables in the model. Using McClelland's measure, 63.7 percent of the variability can be explained. Both R^2 were significant at the .01 level.

Multi-ethnic community group. Among multi-ethnic community students, the relationship, R^2, between the six variables and achievement was .637 when Ai scale scores for achievement motive were used. R^2 was .651 with McClelland scores. Thus, depending upon the achievement motive instrument used, 63.7 percent or 65.1 percent of the variability in achievement of this group of students can be explained by these six variables. Both R^2 were significant at the .01 level.

Table 2 shows the relationship between the independent variables acting together and achievement for all groups.

Step 2, Hypothesis 2

A significant contribution is made by each of the seven variables to the variability in educational achievement of Indian students, when the other variables are held constant.

Total group. Analysis of variance for the regression was used to identify the unique contribution of each of the variables in the prediction equation. An F-ratio was computed on all variables. The larger the F, the greater the contribution this variable was making, holding the other variables constant. In all cases the .05 level was the criterion of significance. Tables 3 and 4 show the total group analyses.

Variable 1. Interaction with the dominant culture. Using Ai scale scores as the measure of achievement motive, an F-ratio of 11.282 was produced for the variable interaction with the dominant culture. The F-ratio indicated that this variable made the second highest contribution towards predicting achievement of the seven variables in the model. A slight difference in the F-ratio (10.846) resulted when McClelland's measure scores were used in place of Ai scale scores. Both F-ratios were significant at the .01 level.

Variable 2. Achievement motive. An F-ratio of 1.077 using the Ai scale scores and .546 using McClelland's measure scores indicated that this variable's contribution to predicting achievement was not significant at the .05 level.

Variable 3. Mental ability. Tables 3 and 4 show that mental ability was the variable which made the greatest contribution towards predicting educational achievement of Indian students. With Ai scale scores included, an F-ratio of 80.602 was found; with McClelland's measure scores the F-ratio was 73.995. Both F-ratios were significant at the .01 level.

Variable 4. Level of anxiety. An F-ratio of .836 using Ai scale scores or .832 using McClelland's measure scores indicated that anxiety made a small contribution towards predicting achievement among Indian students. Neither was significant at the .05 level.

Table 2. The relationship between the independent variables acting together and achievement, by multiple regression model

Group	Degrees of Freedom	R	R^2	F Ratio	Significance
Total 1	8/131	.778	.606	25.1	.01
Total 2	8/127	.774	.559	23.743	.01
*Rural Reservation[1]	6/32	.802	.641	8.941	.01
*Rural Reservation[2]	6/32	.801	.641	9.506	.01
*Urban Colony[1]	6/44	.803	.645	13.307	.01
*Urban Colony[2]	6/40	.798	.637	11.713	.01
*Multi-ethnic Community[1]	6/43	.796	.634	12.39	.01
*Multi-ethnic Community[2]	6/43	.807	.651	13.362	.01

---

[1] Ai scale scores have been used as the measure of achievement motive.

[2] McClelland's measure scores have been used as the measure of achievement motive.

*Residence groups. Residence environment has been eliminated as an independent variable.

Table 3. Total group analysis of the contribution that each of seven variables makes to achievement using Ai scale scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	448.19	11.282	.01
Achievement motive	1	42.79	1.077	
Mental ability	1	3201.95	80.602	.01
Level of anxiety	1	33.21	.836	
Verbal concept choice	1	397.77	10.013	.01
Self-concept	1	111.63	2.810	
Residence environment	1	307.70	7.746	.01
Error	131	39.73		

Table 4. Total group analysis of the contribution that each of the seven variables makes to achievement using McClelland's measure scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	439.047	10.846	.01
Achievement motive	1	22.096	.546	
Mental ability	1	2995.278	73.995	.01
Level of anxiety	1	33.678	.832	
Verbal concept choice	1	364.207	8.997	.01
Self-concept	1	78.945	1.950	
Residence environment	1	329.132	8.131	.01
Error	127	40.479		

Variable 5. Verbal concept choice. The contribution of this variable towards predicting achievement was third highest among the seven independent variables and significant at the .01 level. Substituting achievement motive scores from two measures in the analysis yeilded slightly different F-ratio. The F-ratio with Ai scale scores was 10.013; with McClelland's measure scores, the F-ratio was 8.997.

Variable 6. Self-concept. Computations showed that self-concept did not significantly contribute (.05 level) to the prediction of achievement among Indian students. Using Ai scale scores, the F-ratio was 2.810. With McClelland's measure scores the F-ratio was 1.950.

Variable 7. Residence environment. The fourth highest contribution towards predicting achievement among Indian students was residence environment. Using Ai scale scores the F-ratio was 7.746. When McClelland's measure scores were substituted, the F-ratio was 8.131. Both F-ratios were significant at the .01 level.

On the basis of these results, we must reject the original hypothesis concerning the significance of each of the variables and accept an alternative that there is a significant contribution made by four of the seven variables (interaction with the dominant culture, mental ability, verbal concept choice, and residence environment) to the educational achievement of Indian students.

Residence groups. It is interesting to note the difference in contribution of each of the independent variables when residence environment was removed from the model and computations were made by residence category. Analysis of the total group showed four variables (including residence environment) contributing significantly to variability in educational achievement. This pattern was not maintained in all the residence groups. Changes in contribution point to the dependence of the other six independent variables on residence environment and the influence the residence factors have in the total group analysis with respect to each variable.

Rural reservation group.

Variable 1. Interaction with the dominant culture. Neither F-ratios of .439 using Ai scale scores for achievement motive nor .449 using McClelland's measure scores were significant at the .05 level of confidence. This indicated that interaction with the dominant culture was not a significant predictor of achievement among rural reservation students. Tables 5 and 6 show the results of the analysis of thr rural reservation group.

Variable 2. Achievement motive. The F-ratio of .191 found with Ai scale scores or .138 with McClelland's measure scores indicated that the contribution of achievement motive to the prediction of achievement was not significant at the .05 level of confidence.

Variable 3. Mental ability. As in the analysis of the total group, the contribution of mental ability to predicting achievement was greatest of all the independent variables and significant at the .01 level. When Ai scale scores were used, an F-ratio of 45.157 resulted; with McClelland's measure scores the F-ratio was 44.290.

Table 5. Rural reservation group analysis of the contribution that each of six variables makes to achievement using Ai scale scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	14.552	.439	
Achievement motive	1	6.324	.191	
Mental ability	1	1497.964	45.157	.01
Level of anxiety	1	45.149	1.361	
Verbal concept choice	1	.240	.007	
Self-concept	1	17.453	.526	
Error	32	33.172		

Table 6. Rural reservation group analysis of the contribution that each of the six variables makes to achievement using McClelland's measure scores at the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	14.924	.449	
Achievement motive	1	4.59	.138	
Mental ability	1	14.718	44.290	.01
Level of anxiety	1	42.483	1.278	
Verbal concept choice	1	.017	.001	
Self-concept	1	7.752	.233	
Error	32	33.229		

Variable 4. Level of anxiety. The contribution of this variable towards predicting achievement of rural reservation students was not significant at the .05 level. The analyses with Ai scale scores for achievement motive showed an F-ratio of 1.361; with McClelland's measure scores, the F-ratio was 1.278.

Variable 5. Verbal concept choice. Neither F-ratios of .007 using Ai scale scores nor .001 using McClelland's measure scores were significant at the .05 level of confidence. This indicated that verbal concept choice was not a significant predictor of achievement among rural reservation students.

Variable 6. Self-concept. A low F-ratio with either Ai scale scores (.526) or McClelland's measure scores (.233) indicated that the contribution of self-concept towards predicting achievement of rural reservation students was not significant at the .05 level.

Urban colony group. Tables 7 and 8 show the results of the analysis of the urban colony model.

Variable 1. Interaction with the dominant culture. With Ai scale scores the contribution of this variable to the prediction of achievement of urban colony sutdents was significant at the .05 level. An F-ratio of 4.696 placed interaction with the dominant culture as the third highest contributor to predicting achievement among the six variables. However, when McClelland's measure scores for achievement motive were substituted in the analysis, the contribution dropped, as shown by an F-ratio of 3.005. This F-ratio was not significant at the .05 level of confidence.

Variable 2. Achievement motive. An F-ratio of 1.432 with Ai scale scores and .486 with McClelland's measure scores indicated that the contribution of achievement motive towards predicting achievement of urban colony students was not significant at the .05 level of confidence.

Variable 3. Mental ability. Using Ai scale scores to indicate achievement motive, the F-ratio for mental ability was 7.849. This indicated a significant contribution of .01 for this variable among urban colony students. However, with McClelland's measure scores the F-ratio was 4.933. This was significant at the .05 level. In either case, the contribution of mental ability towards predicting achievement was second among the six variables.

Variable 4. Level of anxiety. Level of anxiety did not contribute significantly (.05 level) towards predicting achievement among urban colony students. The F-ratio with Ai scale scores for achievement motive was 3.167. When McClelland's measure scores were used the F-ratio was 3.246.

Variable 5. Verbal concept choice. Tables 7 and 8 show that verbal concept choice was the variable which made the greatest contribution towards predicting the achievement of urban colony students. This represented a substantial difference in the contribution of this variable from that found in the analysis of the total group or other residence groups. With Ai scale scores, the F-ratio was 13.962. With McClelland's measure scores, the F-ratio was 14.889. Both were significant at the .01 level.

Table 7. Urban colony group analysis of the contribution that each of the six variables makes to achievement using Ai scale scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	203.042	4.696	.05
Achievement motive	1	61.900	1.432	
Mental ability	1	339.418	7.849	.01
Level of anxiety	1	136.924	3.167	
Verbal concept choice	1	603.746	13.962	.01
Self-concept	1	173.548	4.013	
Error	44	43.241		

Table 8. Urban colony group analysis of the contribution that each of six variables makes to achievement using McClelland's measure scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	132.479	3.005	
Achievement motive	1	21.4353	.486	
Mental ability	1	217.492	4.933	.05
Level of anxiety	1	143.103	3.246	
Verbal concept choice	1	656.414	14.889	.01
Self-concept	1	145.080	3.291	
Error	44	44.0874		

Variable 6. Self-concept. Self-concept did not contribute significantly (.05 level) towards predicting achievement among this group of Indian students. With Ai scale scores used to indicate achievement motive the F-ratio was 4.013. Substituting McClelland's measure scores, the F-ratio was 3.291.

Multi-ethnic community group. (Tables 9 and 10)

Variable 1. Interacting with the dominant culture. The contribution of this variable towards predicting achievement among multi-ethnic community students was second highest among the six independent variables and significant at the .01 level. Changing achievement motive scores in the analysis yielded slightly different F-ratios. The F-ratio with Ai scale scores was 7.759; with McClelland's measure scores, the F-ratio was 8.798.

Variable 2. Achievement motive. An F-ratio of .001 using the Ai scale scores and 2.118 using McClelland's measure scores indicated a substantial discripancy between the two instruments in measuring the achievement motive of this group of students. In neither case was the F-ratio significant at the .05 level of confidence.

Variable 3. Mental ability. Tables 9 and 10 show that mental ability was the variable which made the greatest contribution towards predicting the educational achievement of multi-ethnic community students. An F-ratio of 29.533 was produced using Ai scale scores; with McClelland's measure scores the F was 35.870. Both F-ratios were significant at the .01 level.

Variable 4. Level of anxiety. An F-ratio of .125 using Ai scale scores or .486 with McClelland's measure scores indicated that the contribution of anxiety towards predicting achievement of multi-ethnic community students was not significant at the .05 level.

Variable 5. Verbal concept choice. Using Ai scale scores for achievement motive, the F-ratio for verbal concept choice was 1.758; with McClelland's measure scores the F-ratio was .860. Both F-ratios indicated that the contribution of this variable towards predicting achievement was not significant at the .05 level of confidence.

Variable 6. Self-concept. Neither F-ratio of .004 using Ai scale scores nor .034 using McClelland's measure scores were significant at the .05 level. This indicated that self-concept was not a significant predictor of achievement among multi-ethnic community students.

Residence group summary. It is noteworthy to see that the computations by residence group yielded results which in some instances, were unlike those produced by the population in toto. As in the analysis of the total group, mental ability remained a significant predictor of achievement among each environment group.

Only the variable mental ability persisted as a significant contributor towards predicting achievement among rural reservation students. F-ratios for the remaining variables were not significant.

Table 9. Multi-ethnic community group analysis of the contribution that each of six variables makes to achievement using Ai scale scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	294.760	7.749	.01
Achievement motive	1	.066	.001	
Mental ability	1	1503.784	39.533	.01
Level of anxiety	1	4.759	.125	
Verbal concept choice	1	66.880	1.758	
Self-concept	1	.136	.004	
Error	43	38.038		

Table 10. Multi-ethnic community group analysis of the contribution that each of six variables makes to achievement using Mc-Clelland's measure scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance
Interaction with the dominant culture	1	320.783	8.798	.01
Achievement motive	1	76.800	2.118	
Mental ability	1	1300.435	35.870	.01
Level of anxiety	1	17.620	.486	
Verbal concept choice	1	31.166	.860	
Self-concept	1	1.228	.034	
Error	43	36.2538		

Among urban colony students, interaction with the dominant culture attained a .05 level of significance, but only when using McClelland's measure scores. The most noticeable differences in the F-ratio of all variables was for verbal concept choice. The F showed that among urban colony students, this variable contributed more towards predicting achievement than mental ability.

Both interaction with the dominant culture and mental ability persisted as significant contributors (.01 level with either achievement motive measure) towards predicting achievement among multi-ethnic community students. This was the only residence group in which interaction with the dominant culture attained the .01 level of significance.

In comparing residence groups, noticeable differences in contributions of the independent variables were seen. This would seem to indicate an interdependence of the variables one upon the other, particularly the substantial influence residence environment was having on most of the independent variables in the total group analysis.

Step 3, Question 1.

Question 1. Which of the seven variables can be removed and still maintain the relationship found as a result of testing hypothesis 1?

To answer this question, all groups were analyzed using a stepwise regression technique to determine the importance of each variable in relation to its effect on achievement.

It should be pointed out that in all groups achievement motive, self-concept, and level of anxiety did not contribute significantly (.05 level of confidence) to the explained variation in achievement. In addition, neither did the variables interaction with the dominant culture or verbal concept choice contribute significantly in the analysis of the rural reservation group; interaction with the dominant culture, using McClelland's measure scores for achievement motive, in the urban colony group; or verbal concept choice in the multi-ethnic community group. However, for purposes of discussion, these variables have been included in the stepwise deletion analyses. The reader should be reminded that the discussion of these particular variables may be based upon spurious relationship. A reduced analysis, presented later in the discussion, deals only with those variables which attained the .05 level of significance.

In the stepwise regression, a new R^2 was computed after each variable was eliminated. Thus, the R^2 reported in tables opposite a variable throughout the chapter represents the percent of variation being explained by that variable with the other variables listed below it still included. By subtracting any one of the R^2 from the one just preceding it, the percent of variation being explained by a particular variable acting together with the remaining variables can be derived.

In addition, partial regression coefficients of all variables were computed. The coefficients were then used as indicators of the effect the variables were having on achievement. Thus, the analysis of the variables not only shows the relationship of the variables to each other as recorded by R^2, but also the trend established by the unit change of the independent variable upon achievement or the dependent variable.

Since the range of possible scores for each instrument differed, the partial regression coefficients should be considered as units of change and are not comparable among variables. For instance, a one point change in unit score would amount to the following percent change when considered on the basis of the range of possible scores: interaction with the dominant culture--1 point equals 8.5 percent of the range; achievement motive (Ai scale)--1 point equals 3.0 percent of the range; achievement motive (McClelland's measure)--1 point equals 3.0 percent of the range; mental ability--1 point equals approximately 1.0 percent of the range; level of anxiety--1 point equals 2.0 percent of the range; verbal concept choice--1 point equals .05 percent of the range; self-concept--1 point equals 2.5 percent of the range. The unit change for interpreting the effects of residence environment on achievement is one student added to or subtracted from the Indian secondary school population.

Having two measures of achievement motivation required that the stepwise regression computations be made twice, once using Ai scale scores and once using McClelland's measure scores. Results of the computations are reported separately. After the analysis of the total group is presented, the residence groups are discussed individually. Ultimately, a reduced analysis (of the total group) is presented. This is the final step in answering question 1.

A total group. Ai scale scores are used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 11.

1. Level of anxiety. When the R^2 with the level of anxiety in the set of independent variables was compared with the R^2 of the succeeding computations (level of anxiety deleted), a difference of .002 was noted. This indicated that .02 percent of the variation in achievement was being explained by this variable. The partial regression coefficient showed that for each point increase in anxiety scores, a decrease of .072 of a point in achievement scores would tend to occur. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

2. Achievement motive. The coefficient of determination (R^2) indicated that achievement motivation contributed 0.4 percent of the explained variation in achievement. A partial regression coefficient of -.116 would indicate that for each point increase in achievement motive scores, a decrease of .116 of a point in achievement scores would tend to occur. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

3. Self-concept. The third variable to be eliminated was self-concept. The coefficient of determination (R^2) showed that this vari-

Table 11. Total group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Level of anxiety	.606	.779	-.072
Achievement motive	.604	.777	-.116
Self-concept	.600	.775	.080
Interaction with the dominant culture	.593	.770	-.984
Verbal concept choice	.562	.749	.072
Residence environment	.530	.728	
Rural			-2.968
Urban			2.686
Multi-ethnic			.282
Mental ability	.489	.699	.309

The R^2 opposite the variable in the table is the percent variable of the achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

able contributed .07 percent of the variation in achievement being explained. A partial regression coefficient indicated that for each point increase in self-concept scores, a corresponding increase of .080 of a point would tend to occur in achievement scores. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

4. Interaction with the dominant culture. Up to this point, little change had occurred in the R^2 as variables were deleted. But when interaction with the dominant culture was eliminated, R^2 showed that it accounted for 3.1 percent of the variation in achievement being explained. The partial regression coefficient indicated a decreasing trend in achievement scores of .984 of a point for each point increase in scores on the instrument measuring interaction with the dominant culture.

5. Verbal concept choice. This variable was the next to last variable to be eliminated from the model. The coefficient of determination (R^2) showed that verbal concept choice accounted for 3.2 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in verbal concept scores, there would tend to be an increase of .072 of a point in achievement scores.

6. Residence environment. The last variable to be eliminated was residence environment. The R^2 differential for this predictor was 4.1, indicating the largest percent variation being explained up to this point. This variable was divided into three categories.

The partial regression coefficient for the rural reservation environment indicated that for every rural reservation student increase in Indian secondary school population, a decrease of 2.97 points would tend to occur in the overall sum of the achievement scores. This would reduce the mean achievement score by .02 of a point. Thus, for some reason(s), living in a rural reservation was a hindrance to achievement.

The coefficient for the urban colony environment indicated that a single student increase from this environment would tend to raise the overall sum of the achievement scores in the population by 2.68 points. This would increase the mean achievement score by .018 of a point. This is an indication that for some reason(s) living in this environment facilitated achievement.

The partial regression coefficient for the multi-ethnic community indicated that an increase of one student from this environment would tend to raise the overall sum of the achievement scores in the population by .282 points. This increase amounts to .001 of a point in the mean achievement score. Although the effect of living in a multi-ethnic community was positive for Indian students, this effect was not as great as that noted for the urban colony environment.

7. Mental ability. The last, and seemingly most important predictor of all seven variables, was mental ability. This variable contributed 48.9 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in I.Q. scores, there would tend to be a corresponding increase of .309 of a point in achievement scores.

Total group. McClelland's measure scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 12.

1. Achievement motivation. Computations revealed no change in the R^2 when achievement motivation was deleted. In other words, with McClelland's measure scores in the model, this variable did not contribute to the variation in achievement explained. The regression coefficient showed that for each point increase in achievement motive scores, a decrease of .081 of a point in achievement scores would tend to occur. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

2. Level of anxiety. The second variable to be eliminated was level of anxiety. The R^2 indicated that this variable contributed 0.3 percent of the variation in achievement explained. The partial regression coefficient showed that for each point increase in anxiety scores. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

3. Self-concept. The next variable to be eliminated was self-concept. The R^2 showed that this variable contributed 0.7 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in self-concept scores, an increase of .066 would tend to occur in the achievement scores. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence.

4. Interaction with the dominant culture. As with the computations using Ai scale scores, the largest amount of change in R^2 was noted when the elimination process included this variable. The R^2 showed that it accounted for 3.1 percent of the variation in achievement being explained. A comparable regression coefficient of -.984 also indicated the same decreasing trend in achievement scores of .984 of a point for each point increase in scores of interaction with the dominant culture.

5. Verbal concept choice. This analysis also showed verbal concept choice as the next to last variable to be eliminated from the model. The R^2 indicated that this variable accounted for 3.0 percent of the variation being explained. The partial regression coefficient showed that for each point increase in verbal concept scores there would tend to be an increase of .074 of a point in achievement scores.

6. Residence environment. In this analysis, R^2 indicated that residence environment accounted for 5.0 percent of the variation in achievement being explained.

The partial regression coefficient for the rural reservation environment indicated that for an increase of one rural reservation student in the Indian secondary school population, a decrease of 3.036 points would tend to occur in the overall sum of the achievement scores. This would reduce the mean achievement score by .021 of a point.

Table 12. Total group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Achievement motive	.599	.774	-.081
Level of anxiety	.599	.774	-.073
Self-concept	.596	.772	.066
Interaction to the dominant culture	.589	.768	-.984
Verbal concept choice	.558	.745	.074
Residence environment	.528	.727	
Rural			-3.036
Urban			2.857
Multi-ethnic			.179
Mental ability	.478	.692	.308

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

The coefficient for the urban colony group indicated that a single student increase in the population from this group would tend to raise the overall sum of the achievement scores in the population by 2.857 points. This would increase the mean achievement score by .019 of a point.

The partial regression coefficient for the multi-ethnic community environment was .179. Thus, an increase of one student in the school population from the multi-ethnic environment would tend to raise the overall sum of the achievement scores by .179 of a point. This meant an increase of .001 of a point in the mean achievement score.

Similar effects of residence environment on achievement are noted with McClelland's scores for achievement motive in the analysis. That is, the rural reservation environment tends to hinder achievement, whereas the urban colony and multi-ethnic community environments tend to facilitate achievement.

7. Mental ability. The last variable to remain in the model was mental ability. This variable contributed 47.8 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in I.Q. scores, there would tend to be an increase of .308 of a point in achievement scores.

Total group stepwise deletion analysis summary. This analysis was in response to the question, "Which of the seven variables can be removed and still maintain the relationship found as a result of testing hypothesis 1?" The results showed the coefficient of determination (R^2) dropping off more rapidly after the final deletion of those variables previously found to be non-significant contributors towards predicting achievement.

All variables were included in the stepwise deletion analysis. For the non-significant variables, the probability of the results reported occurring by chance was greater than .05 level of confidence.

1. Non-significant variables. Slight differences in deletion order and in contribution to the variation in achievement were noted in the variables achievement motivation and level of anxiety when different achievement motive scores were used in the analysis. However, the findings in both cases showed that the variables, achievement motive and level of anxiety, were not important predictors of achievement for this population of Indian students. Results also showed that self-concept was not an important predictor of achievement; but where self-concept was influencing achievement scores, that influence was positive.

2. Significant variables. The R^2 differentials indicated that interaction with the dominant culture, verbal concept choice, residence environment and mental ability were the most important predictors of achievement. The negative partial regression coefficient for interaction with the dominant culture suggested that greater interaction would tend to have a negative effect on achievement. The regression coefficient for verbal concept choice indicated that an increase in verbal concept ability would tend to result in greater achievement.

The effect of residence environment with respect to achievement was negative for rural reservation students. Living in a rural reservation for some reason(s), hindered achievement.

By contrast, living in an urban colony or multi-ethnic community facilitated achievement, with greater positive effects noted for the urban colony environment. Mental ability was the single most important predictor of achievement.

Rural reservation groups. Ai scale scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 13.

All variables were included in the stepwise deletion analysis. Previously, it was found that the contribution of five of the variables to the variation in achievement was not significant. For these variables the probability of the following results occurring by chance is greater than the .05 level of confidence.

1. Non-significant variables.

a. Verbal concept choice. Computations indicated that no change occurred in the R^2 when the variable verbal concept choice was deleted from the model. Thus, this variable did not contribute to the explained variation in achievement among rural reservation students. The regression coefficient showed that for each point increase in verbal concept scores a decrease of .005 of a point would tend to occur in achievement scores.

b. Achievement motive. The R^2 showed that achievement motive contributed 0.2 percent of the variation in achievement being explained when in the model. The partial regression coefficient indicated that for each point increase in achievement motive scores, the achievement scores would tend to decrease .136 of a point.

c. Interaction with the dominant culture. The third variable to be eliminated was interaction with the dominant culture. According to R^2, this variable contributed 0.5 percent of the variation in achievement being explained. The regression coefficient indicated that for each point increase in interaction with the dominant culture scores, a decrease of .377 of a point would tend to occur in achievement scores.

d. Self-concept. The next variable to be eliminated was self-concept. The R^2 indicated that it contributed 0.2 percent of the variation in achievement being explained. The partial regression coefficient showed that for every point increase in self-concept scores, achievement scores would tend to increase .079 of a point.

e. Level of anxiety. The last variable to be deleted was level of anxiety. An R^2 differential of 3.1 indicated that anxiety contributed 3.1 percent of the variation in achievement among rural reservation students. The regression coefficient showed that for every point increase in anxiety scores a decrease of .175 of a point in achievement scores would tend to occur.

Table 13. Rural reservation group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Verbal concept choice	.641	.800	-.005
Achievement motive	.641	.800	-.136
Interaction with the dominant culture	.639	.799	-.377
Self-concept	.634	.796	.079
Level of anxiety	.632	.795	-.175
Mental ability	.601	.775	.371

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

2. Significant variable.

a. Mental ability. With Ai scale scores in the model, the most important predictor of achievement among rural reservation students was mental ability. The R^2 showed that this variable contributed 60.1 percent of the variation in achievement being explained. The regression coefficient indicated that for each point increase in I.Q. scores, an increase of .371 of a point would tend to occur in achievement scores.

Rural reservation group. McClelland's measure scores were used as the measure of achievement motive. The variables are presented in order of deletion as in Table 14.

All variables were included in the stepwise deletion analysis. Previously it was found that the contribution of five of these variables to the variation in achievement was not significant. For these variables, the probability of the following results occuring by chance is greater than the .05 level of confidence.

1. Non-significant variables.

a. Verbal concept choice. As with Ai scale scores in the analysis, this variable was the first to be eliminated and no change occurred in the R^2 in the elimination process. This also indicated that verbal concept choice did not contribute to the explained variation in achievement of rural reservation students. The regression coefficient showed that for each point increase in verbal concept scores, a decreasing trend of .001 of a point would occur.

b. Achievement motive. The R^2 showed that with McClelland's measure scores in the analysis, achievement motive also contributed 0.2 percent of the variation in achievement being explained. The regression coefficient indicated that for each point increase in achievement motive scores, there would tend to be an increase of .376 of a point in achievement scores.

c. Interaction with the dominant culture. The next variable to be deleted was interaction with the dominant culture. As with Ai scale scores, R^2 showed that this variable contributed 0.5 percent of the variation in achievement scores. The regression coefficient indicated that for each point increase in interaction scores, achievement scores would tend to decrease .382 of a point.

d. Self-concept. The R^2 showed that self-concept contributed 0.2 percent of the variation in achievement being explained. The regression coefficient indicated that for each point increase in self-concept scores, an increase of .056 of a point would tend to occur in achievement scores.

e. Level of anxiety. As with Ai scale scores, the last variable to be eliminated was level of anxiety. The R^2 also showed that anxiety contributed 3.1 percent of the explained variation in achievement. The partial regression coefficient indicated that for each point increase in anxiety scores a decrease of .163 of a point in achievement scores would tend to occur.

Table 14. Rural reservation group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Verbal concept choice	.641	.800	-.001
Achievement motive	.641	.800	.376
Interaction with the dominant culture	.639	.799	-.382
Self-concept	.634	.796	.056
Level of anxiety	.632	.795	-.163
Mental ability	.601	.775	.370

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

2. Significant variable.

a. Mental ability. The final variable remaining in the analysis was mental ability. The R^2 showed that this variable contributed 60.1 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in I.Q. scores, an in-rease of .370 of a point would tend to occur in achievement scores.

Rural reservation group stepwise deletion summary. It may be noticed in the residence group analyses that when residence environment was removed as an independent variable and computations made by residence category, the remaining independent variables often assumed a different rank order in importance as predictors of achievement than found in the analysis of the total group. This was particularly true in the rural reservation model. However, the difference in rank, it must be remembered, could have occurred by chance because only one of the variables (mental ability) was significant at the .05 level.

Urban colony group. Ai scale scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 15.

All variables were included in the stepwise deletion analysis. Previously it was found that the contribution of three of these variables to the variation in achievement was not significant. For these variables the probability of the following results occurring by chance is greater than the .05 level of confidence.

1. Non-significant variables.

a. Achievement motive. The first variable to be eliminated in the urban colony model was achievement motive. The R^2 showed that achievement motive contributed 0.2 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in achievement motive scores, a decrease of .199 in achievement would tend to occur.

b. Self-concept. The R^2 indicated that self-concept contributed 2.1 percent of the explained variation in achievement. The regression coefficient showed that for each point increase in self-concept scores, achievement scores would tend to increase .173 of a point.

2. Significant variables.

a. Interaction with the dominant culture. The next variable to be deleted was interaction with the dominant culture. According to R^2, this variable contributed 2.3 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in interaction scores, a decrease of .152 would tend to occur in achievement scores.

b. Level of anxiety. This variable did not contribute significantly to the explained variation in achievement. Thus, the probability of this being a random effect is greater than the .05 level of confidence. Level of anxiety was the fourth variable to be eli-

Table 15. Urban colony group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Achievement motive	.645	.803	-.199
Self-concept	.633	.796	.173
Interaction with the dominant culture	.612	.782	-.152
Level of anxiety	.589	.765	-.265
Mental ability	.562	.750	.176
Verbal concept choice	.441	.665	.146

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

minated. The R^2 showed that this variable was producing 2.7 percent of the variation being explained in achievement among urban colony students. The partial regression coefficient showed that a decrease in achievement scores of .265 of a point would tend to occur for each point increase in anxiety scores. (It should be remembered, this variable was not significant at the .05 level.)

c. Mental ability. Mental ability was the last variable to be deleted. The R^2 indicated that this variable contributed 12.1 percent of the variation in achievement being explained. The regression coefficient showed that an increase in achievement scores of .176 of a point would tend to occur for each point increase in I.Q. scores.

d. Verbal concept choice. The variable remaining after all deletions were made was verbal concept choice. As a result, this variable must be considered the most important predictor of achievement among urban colony students. The R^2 showed that it contributed 44.1 percent of the variation being explained. The partial regression coefficient indicated that for each point increase in verbal concept scores, achievement scores would tend to increase by .146 of a point.

Urban colony group. McClelland's measure scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 16.

All variables were included in the stepwise deletion analysis. Previously it was found that the contribution of four of these variables to the variation in achievement was not significant. For these variables, the probability of the following results occuring by chance is greater than the .05 level of confidence.

1. Non-significant variables.

a. Achievement motive. As with Ai scale scores, this variable was the first to be deleted. The R^2 showed that it contributed 0.4 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in achievement motive scores, a decrease of .461 of a point in achievement would tend to occur.

b. Self-concept. The R^2 showed that self-concept contributed 2.7 percent of the explained variation in achievement. The partial regression coefficient indicated that an increase in achievement scores of .146 would tend to occur for each point increase in self-concept scores.

c. Interaction with the dominant culture. The next variable to be deleted was interaction with the dominant culture. The R^2 indicated that this variable accounted for 2.7 percent of the variation in achievement being explained. The partial regression coefficient showed that a decrease of .013 of a point would tend to occur in achievement scores for each point increase in interaction scores.

Table 16. Urban colony group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Achievement motive	.637	.789	-.461
Self-concept	.633	.796	.146
Interaction with the dominant culture	.606	.778	-.013
Level of anxiety	.573	.757	-.287
Mental ability	.543	.737	.159
Verbal concept choice	.436	.660	.180

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variables eliminated.

d. Level of anxiety. The fourth variable to be eliminated was level of anxiety. The R^2 showed that this variable was producing 3.0 percent of the variation being explained in achievement. The partial regression coefficient indicated that for each point increase in anxiety scores, achievement scores would tend to decrease .287 of a point.

2. Significant variables.

a. Mental ability. Mental ability was the last variable to be deleted. The R^2 indicated that this variable contributed 10.7 percent of the variation in achievement. The regression coefficient showed than an increase in achievement scores of .159 of a point would tend to occur for each point increase in I.Q. scores.

b. Verbal concept choice. As with Ai scale scores, the most important predictor of achievement among urban colony students was verbal concept choice. The R^2 showed that it accounted for 43.6 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in verbal concept scores, achievement scores would tend to increase .180 of a point.

Urban colony group stepwise deletion analysis summary. A different deletion order from either the total group or rural reservation group occurred in the stepwise regression computations of the urban colony group. However, since only two of the variables were significant, the probability of this deletion order occurring among these variables by chance is greater than the .05 level of confidence. Most noticeable was the persistence of verbal concept choice as the last variable remaining in the analysis. Unlike that shown in either the population as a whole or the rural reservation group, this variable contributed more to the variation being explained in achievement than mental ability, although mental ability was the last variable to be deleted and its contribution was high.

Multi-ethnic community groups. Ai scale scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 17.

1. Non-significant variables.

a. Achievement motive. Computations indicated that no change occurred in the R^2 when the variable achievement motive was deleted from the analysis. Thus, this variable did not contribute to the explained variation in achievement among multi-ethnic community students. The regression coefficient showed that for each point increase in achievement motive scores a decrease of .008 in achievement scores would tend to occur.

b. Self-concept. There was also no change in the R^2 when the variable self-concept was eliminated. Thus, neither did this variable contribute to the variation in achievement being explained. The regression coefficient indicated that an increase of .004 of a point would tend to occur in achievement scores for each point increase in self-concept scores.

Table 17. Multi-ethnic community group stepwise variable deletion summary using Ai scale scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Achievement motive	.634	.796	.008
Self concept	.634	.796	.004
Level of anxiety	.634	.796	.047
Verbal concept choice	.633	.795	.046
Interaction with the dominant culture	.617	.785	-1.093
Mental ability	.562	.750	.380

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variable eliminated.

c. Level of anxiety. The R^2 indicated that anxiety contributed 0.1 percent of the explained variation in achievement. The regression coefficient showed that for each point increase in anxiety scores, an increase of .047 would tend to occur.

d. Verbal concept choice. The next variable to be eliminated was verbal concept choice. The R^2 indicated that this variable produced 1.6 percent of variation in achievement being explained. The partial regression coefficient showed that for each point increase in verbal concept scores, achievement scores would tend to increase .046 of a point.

2. Significant variables.

a. Interaction with the dominant culture. The last variable to be eliminated was interaction with the dominant culture. The R^2 showed that this variable accounted for 5.5 percent of the variation in achievement being explained. However, the partial regression coefficient indicated that for each point increase in interaction scores, achievement scores would tend to decrease 1.093 points.

b. Mental ability. The variable remaining after all deletions were made was mental ability. The R^2 for this most important predictor of achievement among multi-ethnic community students showed that it contributed 56.2 percent of the explained variation in achievement. The partial regression coefficients indicated that for each point increase in I.Q. scores, achievement scores would tend to increase .380 of a point.

Multi-ethnic community group. McClelland's measure scores were used as the measure of achievement motivation. The variables are presented in order of deletion as in Table 18.

All variables were included in the stepwise deletion analysis. Previously it was found that the contribution of four of these variables to the variation in achievement was not significant. For these variables, the probability of the following results occuring by chance is greater than the .05 level of confidence.

1. Non-significant variables.

a. Self-concept. As with Ai scale scores, computations indicated that no change occurred in the R^2 when the first variable was deleted. However, in this analysis the deletion order was changed. Self-concept, the first variable to be eliminated did not contribute to the explained variation in achievement. The partial regression coefficient showed that for each point increase in self concept scores, achievement scores would tend to decrease .012 of a point.

b. Level of anxiety. The second variable to be eliminated was level of anxiety. The R^2 showed that this variable contributed 0.4 percent of the variation in achievement being explained. The partial regression coefficient indicated an increasing trend of .092 of a point in achievement scores for each point increase in anxiety scores.

Table 18. Multi-ethnic community group stepwise variable deletion summary using McClelland's measure scores as the measure of achievement motive

Variable deleted	R^2	R	Partial Regression Coefficient
Self-concept	.651	.807	-.012
Level of anxiety	.651	.807	.093
Verbal concept choice	.647	.804	.032
Achievement motive	.639	.799	.691
Interaction with the dominant culture	.617	.785	-1.145
Mental ability	.562	.750	.361

The R^2 opposite the variable in the table is the percent variation of achievement explained with the effect of that variable taken into account but the effect of the previously listed variable eliminated.

c. Verbal concept choice. The R^2 indicated that verbal concept choice accounted for 0.8 percent of the explained variation in achievement. The partial regression coefficient showed that for each point increase in verbal concept scores, achievement scores would tend to increase .032 of a point.

d. Achievement motive. The next variable to be eliminated was achievement motive. The R^2 showed that this variable contributed 2.2 percent of the variation in achievement being explained. The regression coefficient indicated that for each point increase in achievement motive scores, achievement scores would tend to increase .691 of a point.

2. Significant variables.

a. Interaction with the dominant culture. The last variable deleted in the model was interaction with the dominant culture. The R^2 showed that this variable produced 5.5 percent of the explained variation in achievement. As with Ai scale scores, the partial regression coefficient was large and negative. The coefficient indicated a decreasing trend of 1.145 points in interaction scores for each point increase in achievement scores.

b. Mental ability. The remaining variable after all deletions occurred was mental ability. This important predictor accounted for 56.2 percent of the variation in achievement being explained. The partial regression coefficient indicated that for each point increase in I.Q. scores, achievement scores would tend to increase .361 of a point.

Multi-ethnic community stepwise deletion analysis summary. Interaction with the dominant culture proved to be an important predictor of achievement among multi-ethnic community students. The large negative regression coefficient indicated a tendency for interaction with the dominant culture to adversely effect achievement. As in the total group and rural reservation analysis, mental ability emerged as the most important predictor of achievement.

Reduced analysis. Following the stepwise procedure, a judgment was made to eliminate three of the original seven variables from the analysis and recompute the contributions of the remaining four variables in a reduced analyses. This was the final step taken in response to the question, "which of the seven variables can be removed and still maintain the relationship found as a result of testing Hypothesis 1?" This procedure was not duplicated for each residence group. It was reasoned that, should the reader be interested in answering this question for each residence group, an inspection of the R^2 in Tables 13 through 18 could provide a close estimate of the cutoff point for each residence group.

The procedure used to determine which of the variables could be removed from the analysis was to: (1) look at the level of significance of all variables and exclude those whose level was greater than .05; and (2) examine the coefficient of determination, R^2, and notice where it started dropping off fairly rapidly.

Achievement motive, level of anxiety and self-concept were not significant contributors and R^2 began dropping off more rapidly after these variables were eliminated from the analysis. These three variables could be eliminated with a loss of apparent relationship of only 1.3 percent using Ai scale scores or 1.0 percent using McClelland's measure scores (see Table 19).

For the reduced analysis, the coefficient of determination, R^2, indicated that 59.3 percent, using Ai scale scores or 58.9 percent using McClelland's measure scores, of the variation in achievement could be explained by the four remaining independent variables. This was significant at the .01 level.

Analysis of variance for the regression was again used with the reduced analysis to identify the significance of the contribution of each of the variables. In addition, the stepwise regression analysis yielded partial regression coefficients to indicate the effect these variables were having on achievement. Having two measures of achievement motive required that the regression computations be made twice, once using Ai scale scores and once using McClelland's measure scores. Results of the computations are reported in Tables 20 and 21.

1. Variable 1. Interaction with the dominant culture. An F-ratio of 10.322 using Ai scale scores or 10.702 using McClelland's measure scores indicated that this variable was making the third highest contribution towards predicting achievement of the four variables in the analysis. This represents a slight change in contribution from the full analysis where this variable's contribution was second. The partial regression coefficient showed that for each point increase in interaction scores, there would tend to be a decrease of .931 of a point (with Ai scale scores) or .551 of a point (with McClelland's measure scores) in achievement scores.

2. Variable 2. Mental ability. F-ratios of 89.537 and 86.637 showed that of the four variables in the reduced analysis, mental ability was the most important predictor of academic achievement. Both F-ratios were significant at the .01 level. The partial regression coefficient indicated that for each point increase in I.Q. scores, achievement scores would tend to increase .317 of a point (with Ai scale scores) or .318 of a point (with McClelland's measure scores).

3. Variable 3. Verbal concept choice. An F-ratio of 12.887 with Ai scale scores or 10.836 with McClelland's measure scores showed that verbal concept choice was the second best predictor of achievement of Indian students. Both F-ratios were significant at the .01 level. The partial regression coefficient indicated that for each point increase in verbal concept scores, achievement scores would tend to increase .079 of a point (Ai scale scores) or .078 of a point (McClelland's measure scores).

4. Variable 4. Residence environment. The last of the variables in the reduced analysis was residence environment. F-ratios of 6.653 and 7.760 showed that this variable's contribution to the prediction of achievement was significant at the .01 level.

Table 19. Relationship between the independent variables acting together and achievement, reduced analysis and full analysis

Analysis	d.f.	R	R^2	F Ratio	Significance
Full[1]	8/131	.778	.606	25.1	.01
Reduced[1]	5/131	.775	.593	39.031	.01
Full[2]	8/127	.773	.559	23.743	.01
Reduced[2]	5/130	.775	.589	37.299	.01

[1] Ai scale scores have been used as the measure of achievement motive.

[2] McClelland's measure scores have been used as the measure of achievement motive.

Table 20. Reduced analysis of the contribution that each of four variables makes to achievement using Ai scale scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance	Coefficients
Interaction with the dominant culture	1	414.185	10.322	.01	-.931
Mental ability	1	3592.839	89.537	.01	.317
Verbal concept choice	1	517.127	12.887	.01	.079
Residence environment	2	278.989	6.953	.01	
Rural					-2.788
Urban					2.442
Multi-ethnic					.346
Error	134	40.127			

Table 21. Reduced analysis of the contribution that each of the four remaining variables makes to achievement using McClelland' measure scores as the measure of achievement motive

Variable	d.f.	MS	F Ratio	Significance	Coefficients
Interaction with the dominant culture	1	433.831	10.702	.01	-.551
Mental ability	1	3512.056	86.637	.01	.318
Verbal concept choice	1	439.247	10.836	.01	.078
Residence environment	2	314.568	7.760	.01	
Rural					-2.944
Urban					2.685
Multi-ethnic					.256
Error	130	40.538			

The partial regression coefficient of -2.788 (Ai scale scores) and -2.944 (McClelland's measure scores) for the rural reservation environment indicated that this variable had a negative effect on achievement. The effect shown by the coefficient for the urban colony environment was positive (2.442, Ai scale scores; 2.685, McClelland's measure scores). For some reason(s) living in a rural reservation was a hindrance, while living in an urban colony environment tended to facilitate achievement. Partial regression coefficients of .346 (Ai scale scores) and .256 (McClelland's measure scores) indicated that living in a multi-ethnic community environment also facilitated achievement, but the effect was not as great as the urban colony environment.

Reduced analysis summary. With the variables achievement motive, level of anxiety, and self-concept removed from the analysis the remaining four variables accounted for 59.3 percent (using Ai scale scores) or 58.9 percent (using McClelland's measure scores) of the explained variation in achievement. This represented a difference in variation of only 1.3 percent and 1.0 percent when all variables were included.

Other slight changes were noted in F-ratio and partial regression coefficients. Undoubtedly these changes were the result of some dependence of those variables removed on those retained. For instance, both the F-ratio and partial regression coefficient for mental ability and verbal concept choice increased, which would indicate that performance on the tests measuring anxiety level, self-concept and achievement motive were somewhat dependent on these two variables, their significance and specific effects were similar to that found in the full analysis of the total group.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The objective of this research was to investigate the relationships that existed between eight variables, one of which was residential environment, to the educational achievement of Indian students. The Indian students attended public secondary schools and resided in a rural reservation, an urban colony or a multi-ethnic community. Specifically, the following two hypotheses and one question were tested:

Hypothesis 1. There is a significant relationship between the variables of residence environment, mental ability, reading ability, anxiety, self-concept, achievement motive, verbal concept choice and interaction with the dominant culture, when acting together, and the educational achievement of Indian students.

Hypothesis 2. A significant contribution is made by each of the eight variables to the variability in educational achievement of Indian students, when the other variables are held constant.

Question 1. Which of the eight variables can be removed and still maintain the relationship found as a result of testing hypothesis 1?

Procedures

The population of the study included 178 Indian students, grades 7-12, in Washoe County, Nevada. Data were gathered on seven variables considered to be partially related to academic performance in school: (1) mental ability, (2) reading ability, (3) anxiety, (4) verbal concept choice, (5) self-concept, (6) achievement motivation, and (7) interaction with the dominant culture. Instruments used to provide the data were the California Test of Mental Maturity, Short Form; the California Achievement Test; the California Psychological Inventory; the Taylor Manifest Anxiety Scale; Stone's Verbal Concept Choice Inventory; McClelland's Achievement Motive Measure and Melville's Measure of Interaction with the Dominant Culture. For the independent variable, residence environment, students were categorized by location of residence from records in the district offices. The dependent variable, educational achievement, was measured by performance on the California Achievement Test.

A stepwise multiple regression program was used to analyze the data. This program was available in a computer package at Utah State University and met the demands for handling both continuous and categorical variables in the same statistical model. The first step was to run an analysis of variance for the regression on the total group. This produced a multiple R^2, or coefficient of determination for the seven basic variables. An F-test was then made to determine the significance of the

R^2. The second step was to compute the mean square and F-ratio for each of the independent variables from the sum of squares. The F-ratio was used to determine the significance of the contribution each variable made to the dependent variable achievement. The larger the F, the more the variable was contributing. The third step was to analyze the total group using a stepwise regression technique. The stepwise technique identified the one variable which contributed least to the variation in achievement. That variable was then deleted from the analysis. This process was repeated until one variable remained which contributed most to the explained variation in achievement.

In addition to the total group analysis, three other analyses were made. The populations derived from the three residence environments provided the basis for construction of three residence groups. Rather than treating residence environment as an independent variable, the three residence environments constituted the populations for examining relationships between the remaining six variables and achievement. Each of these three residence groups was analyzed using the same procedure used on the total group.

Two instruments (the Ai scale of the C.P.I. and McClelland's Measure) were used to measure achievement motive. Separate computations were made with scores form each instrument in each analysis. In the conclusion section where scores or percentages are indicated, the findings with Ai scale scores will be reported first. The results using the scores from McClelland's measure will appear immediately afterwards in parentheses.

Findings

Indian public secondary school students residing in three residence environments

Hypothesis 1. The following findings are evident regarding the relationship between seven variables acting together and achievement:

1. Seven variables, when acting together, correlate significantly (.01 level) with the achievement of Indian public secondary school students. These are: (1) residence environment, (2) mental ability, (3) level of anxiety, (4) verbal concept choice, (5) self-concept, (6) achievement motive, (7) interaction with the dominant culture.

2. With the Ai scale, 60.6 percent (59.9, McClelland's measure) of the variability in achievement of these students can be accounted for by the seven variables. This is significant at the .01 level of confidence.

Hypothesis 2. The following findings are evident regarding the contribution of each of the seven variables to the variability in achievement:

1. Four of the seven variables: (1) interaction with the dominant culture, (2) mental ability, (3) verbal concept choice, and (4) residence environment, contribute significantly (.01 level) to the variability in achievement of Indian public secondary school students.

Question 1. The following findings are evident regarding which of the variables can be removed and still maintain the relationship found as a result of testing hypothesis 1.

1. Achievement motive, self-concept, and level of anxiety can be eliminated from the analysis with a loss of apparent relationship of only 1.3 (Ai scale; 1.0, McClelland's measure) percent.

2. The contribution of other variables (when still in the analysis) towards the remaining 59.3 (58.9) percent of variability in achievement being explained is: interaction with the dominant culture--3.1 (3.1) percent; verbal concept choice--3.2 (3.0) percent; residence environment--4.1 (5.0) percent; mental ability--48.9 (47.8) percent.

Indian public secondary school students residing in a rural reservation environment

Hypothesis 1. The following findings are evident regarding the relationship between six variables acting together and achievement:

1. Six variables, when acting together, correlate significantly with the achievement of Indian public secondary school students residing in a rural reservation. These are: (1) mental ability, (2) level of anxiety, (3) verbal concept choice, (4) self-concept, (5) achievement motive, (6) interaction with the dominant culture.

2. Sixty-four and one tenths (64.1) percent of the variability in achievement of rural reservation students can be accounted for by these six variables. This is significant at the .01 level of confidence.

Hypothesis 2. The following findings are evident regarding the contribution of each of the six variables to the variability in achievement:

1. One (1) of the six variables, mental ability, contributes significantly (.01 level) to the variability in achievement of rural reservation students.

Question 1. The following findings are evident regarding those variables which can be removed from the analysis and still maintain the relationship found as a result of testing hypothesis 1:

1. Verbal concept choice, achievement motive, interaction with the dominant culture, self-concept and level of anxiety can be eliminated from the analysis with a loss of apparent relationship of only 4.0 (4.0) percent.

2. Mental ability accounts for 60.1 (60.1) percent of the variation in achievement being explained.

Indian public secondary school students residing in an urban colony environment

Hypothesis 1. The following findings are evident regarding the relationship between six variables acting together and achievement:

1. Six variables, when acting together, correlate significantly with the achievement of Indian public secondary school students residing in an urban colony. These are: (1) mental ability, (2) level of anxiety, (3) verbal concept choice, (4) self-concept, (5) achievement motive, and (6) interaction with the dominant culture.

2. Sixty-four and five tenths (63.7) percent of the variability in achievement of urban colony students can be accounted for by these six variables. This is significant at the .01 level of confidence.

Hypothesis 2. The following findings are evident regarding the contribution of each of the six variables to the variability in achievement:

1. Three of the six variables: (1) verbal concept choice, (2) mental ability, and (3) interaction with the dominant culture contribute significantly (.05 level or less) to the variability in achievement or urban colony students. (Interaction with the dominant culture is not significant with McClelland's measure scores for achievement motive in the model.)

Question 1. The following findings are evident regarding those variableswhich can be removed form the analysis and still maintain the relationship found as a result of testing Hypothesis 1:

1. Achievement motive and self-concept can be eliminated from the analysis with a loss of apparent relationship of only 3.3 (3.1) percent.

2. The contribution of other variables (when still in the analysis) towards the remaining 61.2 (60.6) percent of variability in achievement being explained is: interaction with the dominant culture--2.3 (3.3) percent; mental ability--12.1 (10.7) percent; verbal concept choice--441 (43.6) percent. (Level of anxiety was retained in the model after interaction with the dominant culture was eliminated and accounted for 2.7 (3.0) of the variability in achievement. However, this variable was previously found non-significant.)

Indian public secondary school students residing in a multi-ethnic community

Hypothesis 1. The following findings are evident regarding the relationship between six variables acting together and achievement:

1. Six variables, when acting together, correlate significantly with the achievement of Indian public secondary school students residing in a multi-ethnic community. These are: (1) mental ability, (2) level of anxiety, (3) verbal concept choice, (4) self-concept, (4) achievement motive, (6) interaction with the dominant culture.

2. Sixty-three and seven tenths (65.1) percent of the variability in achievement of multi-ethnic community students can be accounted for by these six variables. This is significant at the .01 level of confidence.

Hypothesis 2. The following findings are evident regarding the contribution of each of the six variables to the variability in achievement:

1. Two of the six variables: (1) interaction with the dominant culture, and (2) mental ability, contribute singificantly (.01 level) to the variability in achievement of multi-ethnic community students.

2. Interaction with the dominant culture makes the second largest contribution.

Question 1. The following findings are evident regarding those variables which can be removed from the analysis and still maintain the relationship found as a result of testing hypothesis 1:

1. Self-concept, level of anxiety, verbal concept choice and achievement motive can be eliminated from the analysis with a loss of apparent relationship of only 1.7 (3.4) percent.

2. The contribution of other variables (when still in the analysis) towards the remaining 61.7 (61.7) percent of variability in achievement being explained are: interaction with the dominant culture--5.5 (5.5) percent; mental ability--56.2 (56.2) percent.

Conclusions

The conclusions drawn as a result of the study are presented according to the referred to population.

Indian public secondary school students residing in three residence environments

The following conclusions are evident regarding Indian public secondary school students of Washoe County, Nevada in general.

1. As a group, residence environment, mental ability, level of anxiety, verbal concept choice, self-concept, achievement motive, and interaction with the dominant culture appear to have an effect on achievement of Indian public secondary school students.

2. Individually, interaction with the dominant culture, mental ability, verbal concept choice, and residence environment effect achievement of Indian public secondary school students.

3. Mental ability explains a great amount of the variability in achievement, and indications are that the effects are positive.

4. Interaction with the dominant culture, verbal concept choice, and residence environment make the second, third, and fourth largest contributions towards explaining the variability in achievement.

5. Greater interaction with the dominant culture tends to have a negative effect on the achievement of Indian public secondary school students.[2]

6. An increase in verbal concept ability tends to improve achievement among Indian students.

7. Residing in a rural reservation tends to hinder achievement, while residing in an urban colony tends to facilitate achievement. Residing in a multi-ethnic community also tends to facilitate achievement but to a lesser degree than residing in an urban colony.[3]

Indian public secondary school students residing in a rural reservation environment

The following conclusions are evident regarding those students in the population who reside in a rural reservation environment.

1. As a group, the factors of mental ability, level of anxiety, verbal concept choice, self-concept, achievement motive and interaction with the dominant culture appear to have an effect on variability in achievement of those students who reside in a rural reservation environment.

2. Mental ability is the predominating and single factor which accounts for variability in achievement. The remaining factors make very little apparent difference.

---

[2] Interviewing and rating for interaction with the dominant culture was done by counselors in charge of testing at each school. It has been assumed that complete communication occurred between interviewers and respondents in the collection of data for this study. However, Brog (1963) suggests that certain conditions in an interview may produce biased results. Irrelevancy of questions to respondents may result in evasive responses. The possibility of evasive responses occurring in this study, due to difficulties in communication or irrelevancy of statements, should not be overlooked.

[3] Attention should be drawn to Table 1, page 14, where it can be seen that a total of 38 dropouts and other students failing to complete the battery of instruments were almost evenly distributed between the urban colony and multi-ethnic groups. All rural reservation students completed the full battery of test.s Thus, mortality could be confounding these results; the subjects lost from the two residence groups could have been different in some measurable way from those who completed the tests (Brog, 1963).

Indian public secondary school students residing in an urban colony environment

The following conclusions are evident regarding those students in the population who reside in an urban colony environment.

1. As a group, the factors of mental ability, level of anxiety, verbal concept choice, self-concept, achievement motive and interaction with the dominant culture appear to have an effect on variability in achievement of those students who reside in an urban colony environment.

2. Verbal concept choice appears to be the greatest single factor in explaining variability among these students. An increase in verbal concept tends to improve achievement among these students.

3. Mental ability also accounts for variability in achievement, however, not to as great an extent as does verbal concept choice.

4. Interaction with the dominant culture also explains variability in achievement, however, its contribution is very small and has an apparent negative effect.

Indian public secondary school students residing in a multi-ethnic community

The following conclusions are evident regarding those students in the population who reside in a multi-ethnic community.

1. As a group, the factors of mental ability, level of anxiety, verbal concept choice, self-concept, achievement motive and interaction with the dominant culture appear to have an effect on achievement of those students who reside in a multi-ethnic community.

2. Mental ability appears to account for the greatest portion of the explained variability in achievement of these students.

3. Interaction with the dominant culture does make a difference, the apparent effect on achievement is negative, however, the contribution made in explaining variability in achievement is greater than the contribution made for the other two groups.

Additional conclusions

The following conclusions are evident with respect to the results of the stepwise deletion analysis by residence environment:

1. The contribution of variables related to achievement may vary among residence groups in a population of Indian public secondary students. Further, the variations of these contributions may distort findings concerning a given population. (For example, the large significant contribution of verbal concept choice to the variability in achievement of the

urban colony group undoubtedly contributed to this variable's significance in the analysis of the total group, for its contribution was small and non-significant in the other two residence groups. Similarly, the high contribution of interaction with the dominant culture in the multi-ethnic community group compared to the other groups undoubtedly influenced its contribution appearing in the total group analysis.)

Recommendations

On the basis of the data from this study, and the conclusions reached from the statistical treatment of the data, the following recommendations seem warranted:

1. The variation in combination of variables that proved to be the best predictors in the three residence groups suggests that prediction with respect to achievement of Indian public secondary school students should be done by residence group, and not by the Indian population of a school district in general.

2. Differences among residential groups suggest that the school curriculum provide school experiences designed specifically for each residential group.

3. Since the rural reservation students are achieving at a level below the other two residential groups, further research should be undertaken to determine (a) the causes for this lower achievement, and (b) recommendations for raising the achievement level.

4. Since achievement in school can be facilitated by more factors than just mental ability, it is suggested that the school and/or community provide situations that would raise the self-concept and achievement motive of Indian students. If this could be done, more variables could be relied upon to help promote desired achievement than the small number indicated at the present time.

5. Recommendation 4 calls for identification of situations which can improve self-concept and achievement motive among Indian public secondary school students. It is recommended that further research be conducted to define and describe these situations.

6. The Indian students are interacting with the national culture every day. According to the findings, this interaction in having a negative effect on the achievement of all Indian students. In addition, the effect seems to increase with acculturation of the Indian family into the non-Indian society. It is suggested that research by undertaken to identify those factors in the interaction process which are hindering achievement so that steps may be taken within the community to eliminate them.

7. The differences among residence groups in the contribution of the six variables to the variability in achievement indicates that more needs to be known about the residence environments of Indian public school students and factors which might be contributing to these dif-

ferences. It is suggested that these factors be identified and their contribution to the variability in achievement among students from the three residence groups determined. In turn, the relationships of these factors to the important predictors found in this study should be established.

8. The study should be repeated in order to determine whether the seven variables show similar relationships to achievement among a larger population and like residential groups of Indian public secondary school students. If the study is repeated, it is recommended that a separate instrument be included in the design to measure reading ability so that the contribution of this variable, acting individually and together with the other variables, can be determined.

9. Further refinement and development of measuring instruments for cross cultural studies in education are needed. Only as techniques of measurement are improved can problems be identified and steps then taken to resolve them.

10. The design of this study did not call for an accounting of the loss of explained variability in achievement due to (a) interaction effects among the seven variables with respect to achievement (see Figure 1, page 18), and (b) curvilinear relationships between the seven variables and achievement. It is recommended that future studies consider losses which might occrue from these effects and relationships.

Speculation

Significant variables

Partial regression coefficients computed for the independent variables in this study showed important trends. The negative partial regression coefficient for interaction with the dominant culture indicated that greater interaction would tend to have a negative effect on achievement. These findings were not consisted with Melville's (1966) findings. Melville reported a positive significant relationship between interaction with the dominant culture and academic achievement of 100 federally sponsored Navajo students who had been removed from the reservation to a small community in Utah to live and attend school.

Differences in these findings might be indicative of the traumatic struggle inherent in a marginal social existence. The inability of Indian students to gain acceptance by the new culture after rejection of the old could result in progressive indifference towards achievement.

Verbal concept choice emerged as a significant predictor of achievement for the population as a whole and the best predictor for urban colony students. Other studies have shown a significant relationship between conceptual level and achievement (Braun, 1963; Chase, 1961). Could it be that certain identifiable conditions, either in the school or home environments, are serving to raise the verbal conceptual level of some Indian students, particularly of those in the urban colony?

Partial regression coefficients showed that the effect of residence environment with respect to achievement was negative for rural reservation students and positive for urban colony and multi-ethnic community students. Studies of Indian groups which have attempted to determine the relationship between achievement and residence environment are limited. Several writers have suggested that isolation was detrimental to the education of Indian students. "Most pupils (American Indians) tend to cling to the customs and values practices in their homes and to view the subject matter with the detached eye of a practical man. How can this be of any use to us?" (Wax, 1963, p. 698) Epperson (1963) claimed that high isolation from peer groups was related to low actualization of a pupils' academic potential. Isolation is an identifiable factor with the rural reservation environment.

The most important predictor of all four variables was mental ability. Writers have indicated that mental ability because of its relatively high correlation with achievement is the best single predictor of academic success (Straud and Blommers, 1957). Borg (1963), however, has stated that a correlation of the magnitude found in this study (v=.69) is suitable only for crude group predictors.

Non-significant variables

Mention should be made of the three variables which did not contribute significantly to achievement scores in any of the four analysis models.

Achievement motive. In the case of achievement motive, although two separate measures were taken and regression analysis made, the non-significant results could have been due to several reasons, one of which was the use of inappropriate instruments. Another is that the motivation to achieve independently has not been a traditional characteristic of many Indian people; but rather they have been oriented toward cooperative achievement (Melville, 1966). Still another reason can be drawn from a study by Gill and Spilka (1962) who concluded that independent initiative was not a characteristic of lower socio-economic groups. For these groups success or failure was less personalized. They were only familiar with external indicators of achievement such as employment or unemployment so there was little striving to achieve unless that achievement involved a meaningful material reward. If such was the case among the Indian students in this study, they too might not have been motivated in school because there was no material reward.

Level of anxiety. Computations show that anxiety did not significantly contribute to academic achievement. This might be accounted for by a number of reasons. School may not be a serious anxiety-arousing situation for this population for Indian students. That is, the pressure to succeed, which might increase as a student remains in school, was not affecting the group tested. Neither were conflicts which might have been aroused by the attraction of materialism, folkways, and mores of the non-Indian as opposed to the Indian culture. Perhaps, sufficient familiarity with the demands of the public schools had been gained so that the system was not producing undue anxiety. However, it should be remembered that 12.5 percent of the original Indian secondary school population dropped out of school prior or during the early stages of testing. Another 9.0 percent failed to complete the test batteries due to frequent absences. Nothing is known of the anxiety level of this group of students.

Self-concept. The contribution of the variable self-concept to achievement was also non-significant. In a study of 945 secondary students, Melville (1966) found self-concept scores of Navajo students to be significantly lower than their non-Navajo contemporaries. Self-concept also showed a non-significant correlation for the non-Navajos. According to Melville, the significant correlation indicated that strong positive feelings about oneself are related to academic achievement. He suggested that lower achievement, social isolation, economic level of the students' families and lack of successful Indian models caused Navajo students to wonder about their personal worth and chances for succeeding and thus impaired their self-concept. Like the Navajos in Melville's study, the insignificant contribution made by this variable to the achievement level could be suggestive of school being an impersonal experience for the Indian students included in this study. The Indian students could have feelings of being outsiders in a situation that is not tailored to their desires and needs. Representing less than 2.0 percent of the total secondary school population, the Indian students might will feel that the school belongs to non-Indian students. Finally, the non-significant contribution of self-concept could be indicative of the amount of success Indian students as a group are enjoying in the 12 schools included in the study. Were these students achieving at a higher rate, their self-concept could rise.

BIBLIOGRAPHY

Andrews, Frank M., James N. Morgan, and John A. Songquest. 1967. Multiple classification analysis: A report on a computer program for multiple regression using categorical predictors. Survey Research Center, University of Michigan, Ann Arbor, Michigan.

Balow, Irving H. 1964. Reading and computation ability as determinants of problem solving. Arithmetic Teacher 11:18-22. January.

Bass, Willard P. 1968. An analysis of academic achievement of Indian high school students in federal and public schools: A first year progress report to the Bureau of Indian Affairs. Southwestern Cooperative Educational Laboratory: Albuguerque, New Mexico.

Bental, Grace. 1966. Differences in mental ability and academic achievement of two groups of high school graduates. The Journal of Educational Research 60:127-134. February.

Biggs, J. B. 1959. Teaching of mathematics II attitudes to arithmetic number anxiety. British Journal of Educational Research 1(3):6-21.

Binder, Dorothy Margaret. 1965. Relationships among self-expectations, self-concept and academic achievement. Unpublished Ph.D. dissertation, University of Wisconsin, Madison, Wisconsin.

Bond, Eva. 1938. Reading and ninth grade achievement. Unpublished Ph.D. dissertation, Columbis University Teachers College, New York, New York.

Borg, Walter R. 1963. Educational research: An introduction. David McKay Company, Inc.: New York, New York.

Braun, Jean S. 1963. Relation between concept formation ability and reading achievement at three developmental levels. Child Development. 34:675-682, September.

Buros, Oscar Krese. 1957. California psychological inventory manual. Consulting Psychologists Press, Inc., Palo Alto, California.

Buros, Oscar Krese (Ed.). 1965). The mental measurements yearbook, sixth edition. Gryphon Press, Highland Park, New Jersey.

Carroll, John B. 1964. Words, meanings, and concepts. Harvard Educational Review 34:178-202. Spring.

Carson, Arnold S. and A. I. Robin. 1960. Verbal comprehension and communication in Negro and white children. Journal of Educational Psychology 5:47-51. April.

Chase, Clinton I. 1961. An application of levels of concept formation to measurement of vocabulary. The Journal of Educational Research 55:75-78. October.

Christensen, L. Clair. 1968. Resource development report Reno-Sparks Indian colony. Division of Agricultural Economics and Education, Cooperative Extension Service: University of Nevada, Reno, Nevada.

Christopher, Samuel A. 1967. Parental relationship and value orientation as factors in academic achievement. Personnel and Guidance Journal 45:9 May.

Coombs, L. M., R. E. Kron, E. G. Collister, and K. E. Anderson. 1958. The Indian child goes to school. Haskell Press, Lawrence, Kansas.

Davis, W. Allison, and Robert J. Havighurst. 1948. The measurement of mental systems. The Scientific Monthly 66:301-316. April.

Draper, N. R., and H. Smith. 1966. Applied regression analysis. John Wiley and Sons, Inc., New York.

Edwards, J. Thomas. 1965. Learning problems in cultural deprivation: Reading and inquiry. Conference proceedings: International Reading Association, Newark, Delaware.

Epperson, David C. 1963. Some interpersonal and performance correlates of classroom alienation. School Review. 71:360-376, Autumn.

Garth, Thomas R., and Owen D. Smith. 1937. The performance of full blood Indians on language and non-language intelligence tests. Journal of Abnormal and Social Psychology 32:376-381. October-December.

Gay, Cleveland Johnson. 1966. Academic achievement and intelligence among Negro eighth grade students as a function of the self-concept. Unpublished Ph.D. dissertation, North Texas State University, Denton, Texas.

Gill, Lois J. and Bernard Spilka. 1962. Some non-intellectual correlates of academic achievement among Mexican-American Secondary School children. Journal of Educational Psychology. 53:144-149, June.

Gough, Harrison G. 1953. What determines the academic achievement of high school students? The journal of Educational Research 46: 321-331. January.

Haglund, E. A. 1961. The Washoe, Paiute and Shoshone Indians of Nevada. Nevada State Department of Education, Carson City, Nevada.

Harner, Nellie Shaw. 1965. History of the Pyramid Lake Indians. Unpublished M.A. thesis. University of Nevada, Reno, Nevada.

Harvey, Walter R. 1964. Computing procedure for a generalized least squares analysis program. U. S. Department of Agriculture Ag Research Service. Beltsville, Maryland.

Havighurst, R. J. 1957. Education among American Indians: individual and cultural aspects. The annals of the American Academy of Political and Social Science: Philadelphia, Pennsylvania 311:105-115.

Havighurst, R. J., and Reha R. Hilkevitch. 1944. The intelligence of Indian children as measured by a performance scale. Journal of Abnormal and Social Psychology 39:419-433. October.

Hirschi, Frank W. 1969. The relationship of selected variables to the voting record of Idaho legislators on public school legislation. Unpublished Ed.D. dissertation. Utah State University, Logan, Utah.

Inter-Tribal Council of Nevada. 1969. Nevada Indian Reservations Welcome you. Reno, Nevada.

Johnson, John Joseph. 1966. Acculturation of two ethnic groups and resultant change in mental ability test scores. Unpublished Ph.D. dissertation, University of Nebraska, Lincoln, Nebraska.

Keller, E. DuWayne, and Vinton N. Rowley. 1964. The relations among anxiety, intelligence and scholastic achievement in junior high school children. The Journal of Educational Research 54:4.

Leland, Jay, and William Gomberg. 1964. We need to be shown: A study of the talents, work potential and aspirations of the Pyramid Lake Indians. The Desert Research Institute, University of Nevada: Reno, Nevada.

Lynn, R. 1962. Comments on the article by J. B. Biggs. British Journal of Educational Psychology 32:196-200. February.

Lynn, R., and I. Gordon. 1961. The relation of neuroticism and extraversion to intelligence and educational attainment. British Journal of Educational Psychology 3L;194-203.

Maynard, Eileen. 1968. Negative ethnic image among Oglala Sioux high school students. Pine Ridge Research Bulletin. U. S. Public Health Service, Division of Indian Health, Community Health Program. Pine Ridge, South Dakota. December.

McBee, George and Ralph L. Duke. 1960. Relationship between intelligence, scholastic motivation and academic achievement. Psychological Reports 6:38. February.

McClelland, David C. 1953. The achievement motive. Appleton-Century-Crofts, Inc.: New York.

McCombe, L. E., Z. Vogt, and C. Kluckhohn. 1951. Navajo means people. Harvard University Press, Cambridge, Massachusetts.

Melville, Robert D. 1966. What are the factors which enhance or retard educational achievement of Navajo Indian students in the Sevier School District? Unpublished Ph.D. dissertation, Utah State University, Logan, Utah.

Morris, Joyce. 1966. An investigation into language-concept development of primary school Pueblo Indian children. Unpublished Ph.D. dissertation, University of New Mexico, Albuquerque, New Mexico.

Ort, Lorene Love. 1962. Reading difficulties--a contributing factor to underachievement and failure in school. Exceptional Children 28:489-492. May.

Osborne, R. R. 1960. Racial differences in mental growth and school achievement: A longitudinal study. Psychological Reports 7:233-239. October.

Parmee, Edward A. 1968. Formal education and culture change. The University of Arizona Press: Tucson, Arizona.

Perkins, Hugh V. 1958. Factors influencing change in children's self-concepts. Child Development 29:221-230. June.

Phillips, Clarence. 1960. The relationship between arithmetic achievement and vocabulary knowledge of elementary mathematics. The Arithmetic Teacher 7:240-242. May.

Reese, Hayne W. 1961. Manifest anxiety and achievement test performance. Journal of Educational Psychology 52:132-135. June.

Roessel, Robert A. 1963. Results of current research in Indian education performed by Arizona State University. Annual Conference of the Coordinating Council for Research in Indian education. Arizona State Department of Education, Phoenix, Arizona. April.

Roseu, Bernard C. 1961. Family structure and achievement motivation. American Sociological Review 26:574-585. August.

Rupiper, Omer J. 1960. Multiple factor analysis of academic achievement: A comparative study of full-blooded Indian and white children. The Journal of Experimental Education 28:177-205. March.

Rusco, Elmer R. 1966. Poverty in Washoe County. Bureau of Governmental Research, University of Nevada: Reno, Nevada. 4:1-3. May.

Seegers, James E., Jr., and Harriett A. Rose. 1963. Verbal comprehension and academic success in college. Personnel and Guidance Journal 92:295-296. November.

Selinger, Alphonse D. 1968. The American Indian high school dropout: The magnitude of the problem. Northwest Regional Educational Laboratory, Portland, Oregon.

Spindler, R. A. 1968. Pine Ridge Research Bulleting. U. S. Public Health Service, Division of Indian Health, Community Health Program, Pine Ridge, South Dakota. April.

Staats, Arthur W. 1954. Verbal habit families and the operant conditioning of word classes. p. 98. In Robert J. C. Harper (Ed.). The Cognitive Processes: Readings. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Stone, David R. 1946. Certain verbal factors in the intelligence test performance of high and low social status groups. Unpublished Ph.D. dissertation. University of Chicago Library, Chicago, Illinois.

Strong, Clinton H. 1963. Motivation related to performance of physical fitness tests. Research Quarterly 34:497-507. December.

Stroud, James B., Paul Blommers, and Margaret Lauber. 1957. Correlation analysis of WISC and achievement. Journal of Educational Psychology 48:18-16. January.

Taylor, Janet A. 1953. A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology 48:285-290. November.

Tireman, L. A. 1955. The bilingual child and his reading vocabulary. Elementary English 32:33-35. January.

Vineyard, Edwin E., and Robert B. Bailey. 1960. Interrelationships of reading ability, listening skill, intelligence and scholastic achievement. Journal of Developmental Reading 3:174-178. Spring.

Wallace, J. G. 1965. Concept growth and the education of the child. A survey of research on conceptualization. New York University Press, New York.

Wax, M. 1963. American Indian education as a cultural transaction. Teachers' College Record, New York. 64(8):693-704.

Ware, Leonard. 1961. The American Indian: In profile. United States Bureau of Indian Affairs, Washington, D. C.

Weiner, Bernard. 1967. The experimental study of achievement motivation. National Association of Secondary School Principals Bulletin 51:51-68. December.

Zintz, Miles V. 1965. Reading success of high school students who are speakers of other languages: Conference proceedings. International reading association, Reading and Inquiry, Newark, Delaware.

Appendix A

Taylor Manifest Anxiety Scale (Taylor, 1953)

Name________________________________ Grade________ School___________
Last First

This inventory contains a series of statements. Read each one, decide how you feel about it, and then mark your answer on the special answer sheet. Make no marks on the inventory itsself. If you agree with a statement, or feel that it is true about you, answer TRUE. If you disagree with a statement, or feel that it is not true about you, answer FALSE.

There are no right or wrong answers on the inventory, therefore, no one need be concerned about passing or failing the test. The time limit is 15 minutes, and it would be greatly appreciated if each statement is considered then answered as accurately and as truthfully as possible.

The following statements are to be responded to by placing a T for True, or a F for False in the appropriate space ON THE ANSWER SHEET. Do not write in the inventory booklet. Indicate your answers on the separate answer sheet provided.

1. I like mechanics magazines.
2. I do not tire quickly.
3. I have a good apetite.
4. I am often sick to my stomach.
5. I think I would like the work of a librarian.
6. I am about as nervous as other people.
7. I like to read newspaper articles on crime.
8. I have very few headaches.
9. I enjoy detective or mystery stories.
10. I work under a great deal of strain
11. I like adventure stories better than romantic stories.
12. I cannot keep my mind on one thing.
13. When I take a new job, I like to be tipped off on who should be gotten next to.
14. I work over money and business.

15. I would like to be a singer.

16. I frequently notice my hand shakes when I try to do something.

17. When someone does me wrong I feel I should pay him back if I can, just for the principle of the thing.

18. I blush as often as others.

19. Most any time I would rather sit and daydream than do anything else.

20. I have diarrhea (the runs) once a month or more.

21. My judgment is better than it ever was.

22. I worry quite a bit over possible troubles.

23. I like to read about history.

24. It makes me nervous to have to wait.

25. I like to read about science.

26. I am easily embarrassed.

27. I am in just as good physical health as most of my friends.

28. I have nightmares every few nights.

29. I prefer to pass by school friends, or people I know but have not seen for a long time, unless they speak to me first.

30. My hands and feet are usually warm enough.

31. A minister can cure disease by praying and putting his hand on your head.

32. I sweat very easily, even on cool days.

33. As a youngster I was suspended from school one or more times for cutting up.

34. When embarrassed, I often break out in a sweat which is very annoying.

35. Everything is turning out just like the prophets of the Bible said it would.

36. I do not often notice my heart pounding, and I am seldom short of breath.

37. I have often had to take orders from someone who did not know as much as I do.

38. I feel hungry almost all the time.

39. I do not read every editorial in the newspaper every day.

40. Often my bowels don't move for several days at a time.

41. I sometimes keep on a thing until others lose their patience with me.

42. I have a great deal of stomach trouble.

43. I like parties and socials.

44. At times I lose sleep over worry.

45. I see things or animals or people around me that others do not see.

46. My sleep is restless and disturbed.

47. I am very strongly attracted by members of my own sex.

48. I often dream about things I don't like to tell other people.

49. I think a great many people exaggerate their misfortunes in order to gain sympathy and help of others.

50. I am often affraid that I am going to blush.

51. I am an important person.

52. My feelings are hurt easier than most people.

53. I enjoy reading love stories.

54. I often find myself worrying about something.

55. I like poetry.

56. I wish I could be as happy as others.

57. My feelings are not easily hurt.

58. I am usually calm and not easily hurt.

59. I am usually calm and not easily upset.

60. I sometimes tease animals.

61. I cry easily.

62. I think I would like the kind of work a forest ranger does.

63. I feel anxious about something or someone almost all the time.

64. I am easily downed in an argument.

65. I am happy most of the time.

66. Any man who is able and willing to work hard has a good chance of succeeding.

67. I practically never blush.

68. These days I find it hard not to give up hope for amounting to something.

69. I would like to be a florist.

70. Sometimes I become so excited that I find it hard to get to sleep.

71. I usually feel that life is worthwhile.

72. I have often felt that if I faced so many difficulties I could not overcome them.

73. It takes a lot of argument to convince most people of the truth.

74. At times I have been worried beyond reason about something that really did not matter.

75. Once in a while I put off until tomorrow what I ought to do today.

76. I do not have as many fears as my friends.

77. I do not mind being made fun of.

78. I have been afraid of things or people that I knew could not hurt me.

79. I think most people will lie to get ahead.

80. I certainly feel useless at times.

81. I go to church almost every week.

82. I find it hard to keep my mind on a task or job.

83. I enjoy stories of adventure.

84. I am more self-conscious than most people.

85. I am the kind of person that takes things hard.

86. I don't seem to care what happens to me.

87. I am a very nervous person.

88. I frequently find it necessary to stand up for what I think is right.

89. Life is often a strain for me.

90. My conduct is largely controlled by the customs of those about me.

91. At times I think -ery little of myself.

92. I like to flirt.

93. I am not at all confident in myself.

94. I like to talk about sex.

95. At times I feel I am about to lose control of my behavior.

96. I believe there is a God.

97. I don't like to face a difficulty or make an important decision.

98. I have never been in love with anyone.

99. I am very confident of myself.

Appendix B

Verbal Concept Choice Inventory (Stone, 1946)

Name ______________________________ Grade _______ School __________
Last First

Directions: Many of the words we commonly use have more than one meaning. Below is a list of 34 such words. After each word circle the best definition and underline the next best definition. The best definition can be anywhere on the list.

The first example shows how one boy did this; you do it for the second example.

Example 1. CROSS
- a. [✓ mean]
- b. hot
- c. indentation
- d. ninth
- e. not
- f. walk over

Example 2. CENTER
- a. football player
- b. like up
- c. middle
- d. time
- e. tire
- f. wire

Do the following items in the same way.

Circle the best answer.
Underline the next best answer

---

1. BOY
   - a. habit
   - b. intend
   - c. tire
   - d. speech
   - e. servant
   - f. youth
2. MACHINE
   - a. salt
   - b. hilt
   - c. rug
   - d. mechanism
   - e. political organization
   - f. overload
3. WIND
   - a. grass
   - b. hen
   - c. twist
   - d. glean
   - e. endure
   - f. breeze
4. ROLL
   - a. gridiron
   - b. rack
   - c. attendance record
   - d. a kind of bread
   - e. a hard metal
   - f. buzzard
5. PROPERTY
   - a. justice
   - b. possession
   - c. characteristic
   - d. fatter
   - e. elevator
   - f. center
6. CURVED
   - a. idle
   - b. earthy
   - c. bent
   - d. arched
   - e. noisy
   - f. unknown

7. PLANT
    a. dwell in a hut
    b. put seeds in the ground
    c. force
    d. sow
    e. inquire
    f. fail

8. LEAVES
    a. alcohol
    b. departs
    c. foliage
    d. hear
    e. melt
    f. dynamite

9. WITHDRAW
    a. pull out
    b. retreat
    c. influence
    d. instruct
    e. kick
    f. laugh aloud

10. PUNCH
    a. plow a filed
    b. sparkle
    c. hit hard
    d. diamond
    e. a drink
    f. bridge

11. STAR
    a. fever
    b. a deep ocean
    c. an important actress
    d. granule
    e. option
    f. planet

12. NUT
    a. pugilist
    b. a crazy person
    c. ornament
    d. a trailer
    e. a hard fight
    f. a kernel

13. SECURE
    a. torn
    b. untroubled
    c. safe
    d. transient
    e. lazy
    f. majestic

14. TRAIN
    a. govern
    b. describe
    c. instruct
    d. district
    e. railroad cars
    f. hermit

15. PICTURE
    a. desert
    b. bar
    c. a movie
    d. an image
    e. legion
    f. fig

16. GLASS
    a. crew
    b. a mirror
    c. creeper
    d. a green plant
    e. a transparent substance
    f. a lung

17. GROWS
    a. sprouts
    b. desiccate
    c. contradict
    d. diagnose
    e. enlarges
    f. avow

18. RECOVER
    a. howl
    b. recognize
    c. relapse
    d. regain
    e. get well
    f. hum

19. PRIDE
    a. mice
    b. relic
    c. self-respect
    d. egotism
    e. crease
    f. bacon

20. DRAWING
    a. picture
    b. journey
    c. raft
    d. stair
    e. lottery
    f. stall

21. TALL
a. high
b. exaggerated
c. proficient
d. moldy
e. busy
f. fierce

22. POINTED
a. lazy
b. pleasant
c. hazy
d. sharp
e. biting
f. filmy

23. SMALL
a. hectic
b. tiny
c. quaint
d. dreadful
e. petty
f. successful

24. BLOW
a. ejaculate
b. hesitate
c. halt
d. brag
e. marinate
f. puff

25. NOT CLEAR
a. endurable
b. muddy
c. suave
d. amazine
e. ambiguous
f. not congenial

26. AIM
a. lift
b. point at
c. intend to
d. heal
e. begin
f. forgive

27. FIRE
a. surge
b. dismiss from work
c. heave a rock
d. flame
e. nose
f. rode

28. ORDER
a. to command
b. possesses
c. a request
d. pole
e. plunge
f. squirrel

29. TRUST
a. pest
b. believe in
c. phone
d. snap
e. perform a task
f. a fund

30. OBJECT
a. twitter
b. disagree
c. passage
d. camel
e. a thing
f. unbutton

31. FIGURES
a. iron
b. realms
c. shirts
d. prospect
e. numbers
f. statues

32. BRIGHT
a. sedate
b. recumbent
c. hairy
d. intelligent
e. shiny
f. durable

33. SERVE
a. obtain
b. jilt
c. frighten a boy
d. banish
e. what a waiter does
f. to help

34. PART
a. spoon
b. health
c. separate
d. a fragment
e. locate
f. loss

Appendix C

California Psychological Inventory

Following is a list of item numbers from the California Psychological Inventory which make up the Ai, Cs, Sp, and Sa scales.* These scales were used to measure the variables achievement motive and self-concept.

Ai scale

3
5
8
20
37
41
50
52
59
63
116
117
121
122
141
145
169
196
204
206
225
237
241
252
255
263
265
270
294

Cs scale

17
23
25
32
40
47
49
55
62
68
72
79
94
128
137
154
160
167
186
190
200
201
220
227
230
233
237
258
283
287

Sp scale

2
4
5
10
14
23
25
30
47
50
54
58
68
69
74
76
77
80
83
92
93
96
97
98
102
108
118
123
134
137
150
152
156
170
174
177
180
187
192
197
200
208
224
226
227
229
231
245
251
259
275
280
282
285
296

Sa scale

3
7
21
31
38
42
47
69
86
101
104
111
112
121
148
146
174
177
179
182
185
197
198
211
216
227
233
247
258
275
284
291
296
300

---

*Items 130, 139, and 273 were deleted from the Ai scale, 103 and 273 from the Cs scale; and 148 from the Sp scale.

Appendix D

Achievement Motive Questionnaire (McClelland, 1953)

Name ________________________ Grade ____________ School ________

Idea 1. A mother and her son--they look worried.

1. Tell what is happening.

2. Tell what happened before.

3. Tell what is being thought or wanted.

4. Tell what will happen.

Idea 2. Two men looking at something--one is older.

1. Tell what is happening.

2. Tell what happened before.

3. Tell what is being thought or wanted.

4. Tell what will happen.

Idea 3. A boy has just left his house.

1. Tell what is happening.

2. Tell what happened before.

3. Tell what is being thought or wanted.

4. Tell what will happen.

Idea 4. A wife with her head on her husband's shoulder.

1. Tell what is happening.

2. Tell what happened before.

3. Tell what is being thought or wanted.

4. Tell what will happen.

Appendix E

Interaction with the Dominant Culture (Interview Schedule)
(Melville, 1966)

High interaction	Moderate interaction	Low interaction	
			Place of residence: multi-ethnic community (high), urban colony (moderate), rural reservation (low)
			School attendance with non-Indian students seven years (high) to one year (low)
			Employment in the multi-ethnic community weekly or oftener (high) to never (low)
			Participation in multi-ethnic community activities such as recreation leagues and church attendance weekly (high) to never (low)
			Visits to stores, cafes, and theaters in city weekly or oftener (high) to never (low)
			Association with non-Indian students in a non-school situation weekly or oftener (high) to never (low)

Name ______________________________ Grade_____ School _________________